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mental and physical, are gradually extinguished. Such is the usual progress of the simple form of the disease, or rather gradual decay of the vital energies, — a decay which is not peculiar to, but which may occur at any time intermediate between, the grand climacteric periods. This simple form of decay is, however, less frequently observed than its complication with other affections. Persons who, together with the anxieties, griefs, and distresses of life, have been subject to disease of some particular organ, as of the lungs, liver, brain, heart, &c., who are of a gouty, rheumatic, or calculous diathesis, generally experience at these epochs an aggravation of such diseases, which assume a more dangerous character from the vital decay which is thus attendant upon them. Indeed, in most cases, these accidents, moral and physical, constitute the exciting causes or occasions of the appearance of climacteric disease, as well as complicate and aggravate its progress.

4. CAUSES.—This disease is more common to men than women, probably owing to the more tumultuous and exhausting life passed by them — to their greater exposure, during the preceding terms of existence, to the numerous causes of mental and corporeal exhaustion incidental to the states of modern society and civilisation. It is not infrequently occasioned by the mental depression arising out of pecuniary losses and disappointments, and the death of old and attached friends and relatives. Thus, we sometimes observe it proceed rapidly to a fatal issue, or combated with great difficulty, after the loss of the partner of the principal part of the patient's existence. It may also be caused by a marriage contracted late in life, or by unusual intemperance, or some accidental shock or commotion of the frame.

5. As to its *nature*, climacteric decay is obviously the concatenated phenomena arising from that exhaustion of the vital energies which takes place at a more or less advanced age, in consequence of the cares, turmoils, and physical exertions, attendant on the existing states of society, particularly in the middle classes of life; the exhaustion manifesting itself especially in these functions which are most intimately related to, and concerned in, the perpetuation of the vital endowment of the frame, and which are actuated by the organic system of nerves. As this decay of the vital energies — this breaking up of the constitution, as it is commonly called — is necessarily experienced by the whole frame, it is obvious, that it may not only be hastened by whatever is either mentally or corporeally injurious, as well as by specific forms of disease, but that it will be more or less remarkably evinced in those organs which have especially suffered during attacks of previous illness: hence the complicated states in which senile decay is usually observed, and the rapid progress and unfavourable issue of maladies appearing about the climacteric periods.

6. TREATMENT.—The simple form of this disease requires tonic and cordial medicines, with generous diet, a dry wholesome atmosphere, change of air, the occasional use of the tonic and deobstruent mineral waters; agreeable occupations and amusements; and, above all, the consolations arising out of the recollection of a well-spent life, and confidence of the future. During the course of treatment, particularly of the complicated states of

the affection, the digestive, secreting, and excreting functions require to be assisted, by means of the warm, bitter, and cordial aperients (F. 86. 214. 266. 572.); and if internal congestions, or sub-inflammatory disorders, manifest themselves, evacuations should not be practised without combining or alternating them with restoratives and tonics. The best aperients are, in such circumstances, rhubarb or aloes combined with gentian, quinine, guaiacum, or myrrh, or with the carbonates of the alkalies and the balsams. But, on all occasions, even of acute disease occurring at the climacteric epochs, it should be recollected, that the vital energies soon feel the shock, not only of the malady, but also of a too active or lowering treatment; and that, even when such practice is most required, we should endeavour to support the powers of life by means the best calculated to fulfil this object, without increasing the morbid action, and to meet the first indications of depression or exhaustion by suitable cordials and tonics. The utmost attention should also be paid to the previous habits and indulgences of the patient; and if the discontinuance of them is likely to sink the constitutional energies still lower, they ought not to be relinquished. Various instances have occurred, showing the ill effects of want of attention to the above caution, during the course of my practice.

7. A gentleman had been for some years attended by the writer. At the age of eighty-one years, during a severe winter, he suffered much from bronchitis, accompanied with great sinking of the vital energies. His habits were social, and he lived highly. He recovered, however, by means of warm diaphoretics, and tonic cordial aperients, with a due regard to his accustomed indulgences, and to the precept of HOFFMANN, "*ne subito muta assueta, quia assuetudo est altera natura.*" The following year he had a similar attack, at his seat in the country. A nearly opposite treatment to that which was adopted by the writer in his previous illness was directed by his medical attendants on this occasion, and in a few days he expired *when seated* on the night-stool, (see HOFFMANN's treatise "*De Situ erecto in Morbis periculosus valde noxio,*") about half an hour after the physician had left him, and given a favourable opinion of the result to his friends.

8. General — had served nearly all his life in the East Indies, and was upwards of eighty, but of a robust constitution. His ailments, when he was seen by me, could not be referred to any particular organ, and were attributed at the time to senile decay: the liver performed its functions. Nothing beyond the regulation and promotion of the digestive and excreting functions was attempted; and he was allowed a light and nutritious diet, with change of air, the use of the Bath water, &c. Under this plan he improved greatly, and was able to travel with ease from one part of the country to the other, and, when in town, to dine daily at the Oriental Club. The last occasion but one on which I saw him, he came to my house, to inform me that his relatives were not satisfied with the progress he had made, and had repeatedly urged him to change his physician. I accordingly retired; but, a few days afterwards, was requested to see him. He was then sinking fast, evidently from the effects of a lowering treatment and of profuse evacuations upon a decayed frame. Speedy dissolution could not be averted;



I therefore declined all interference. He died not many hours afterwards.

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CLIMATE. SYN. (From *κλίμα*, a region). —

*Climat*, Fr. *Das Clima*, Ger. *Clima*, Ital.

CLASSIF. GENERAL PATHOLOGY — *Ætiology and Therapeutics*.

1. Climate, in its rigorous acception, means only a district placed between certain equatorial and meridional circles; but it possesses a much wider signification in medicine, and is more commonly applied to the conditions of the soil, surface, elevation, and position of a country, in connection with the general states of the atmosphere, influencing the health of the human species, and of the higher races of the animal kingdom: — “L'ensemble de toutes les circonstances naturelles et physiques, au milieu desquelles nous vivons dans chaque lieu.” — *CABANIS*.

2. I regret that my limits will not admit of entering fully upon the consideration of the physical conditions which combine in forming the climate of a country, and not only modify the constitution of men, giving rise to a great part of the most acute diseases to which he is liable, but also assist in removing others of a dangerous tendency. It is obvious, that a knowledge of the elements out of which disease arises, and which may be taken advantage of, and even artificially combined, for its removal, must be of essential advantage in the healing art. Indeed, the importance of the subject has been admitted since the time of *HIPPOCRATES*, whose treatise *περί αέρων υδάτων καὶ τόπων* will be read, even at the present day, with the greatest advantage. I shall, therefore, draw a mere sketch of the subject, and indicate the sources whence more detailed information may be obtained.

3. I. THE PHYSICAL RELATIONS OF CLIMATE. — The climate of a district or of a country essentially depends, 1st, upon its position, in respect of distance from the equator; 2d, upon its elevation above the level of the sea, and its proximity to the shores of the ocean, or the beds of large rivers, &c.; 3d, upon the geological and mineralogical formations constituting the basis of its soil; 4th, upon the nature of the soil itself, its cultivation, and the vegetable productions by which it is covered; and, 5th, upon the prevailing winds or currents of air. Under these heads are comprised a number of subordinate phenomena, giving rise to important modifications in the climate of a district. In the brief account, about to be given of the subject, the temperature and humidity of a place will be first considered, and afterwards those circumstances which relate more immediately to the nature of its locality.

4. A. Of the temperature and humidity of climates, and their effects. — The temperature of a place influences not only the organisation, but also the diseases, of the inhabitants; and, as it varies with the latitude, physical conditions of a district, state of cultivation, &c., it is evident that the physicians of the northern countries of Europe have to treat different constitutions and states of disease, from those which come before practitioners in more southerly regions. The effects of temperature upon the human frame vary remarkably, owing to numerous concurrent circumstances, and the extent, rapidity, and frequency of its changes. The mean annual heat, the extreme range of temperature, not only during particular seasons, but also in each month; the usual mean of such month, and daily variation; have altogether a manifest influence upon the human frame. Geographers have divided the globe, in relation to its temperature, into arbitrary divisions, well known as the torrid, the two temperate, and the two frigid zones; but the climate of the countries placed within these divisions are so greatly modified by other circumstances than by distance from the equator, especially by elevation above the level of the sea, by distance from the ocean, want of cultivation, &c., that many places within the temperate zones, and even in those parts of them which are the nearest the meridian, experience, particularly at one period of the year, remarkably low ranges of temperature; whilst others, much further removed from the equator, are subjected, during summer especially, to as great heat as places within the tropics. In countries or districts near the ocean, or large lakes and rivers, and particularly in islands or places partially surrounded or indented by the sea, the extremes of heat are moderated, but the air is moist, and the changes of season are uncertain and variable; whilst in those situate far inland, and removed from lakes or the beds of large rivers, the range of atmospheric temperature is very great, particularly in latitudes above 40° north, or in places considerably elevated above the level of the sea; and the air is remarkably dry. Even in countries within the tropics remote from the ocean, or having high ranges of mountains placed between them and it, that may attract and condense into clouds and rain the moisture carried by the sea winds over the land, the dryness of the atmosphere is very great, and, where the currents of air have passed over extensive tracts of arid country, is even extreme. This is well shown by the Harmattan winds, which, having blown over the dry countries of central Africa, visit its western coast, and change the extreme humidity of that part, during their continuance, to a state of remarkable dryness. In the more inland districts, therefore, of large continents or islands, placed without the torrid zone, the depression of the thermometer during their winter months, and elevation of it in summer, are greater than is indicated by their distance from the equator, and the air is much drier than in places otherwise circumstanced. In these latter, particularly insular situations, &c., the climate is more equable but much more humid. In the former the seasons are regular, the change constant and rapid; in the latter they are variable, irregular, their accession slow, and attended by storms and hurricanes.



5. The intensity of the *solar beams*, and consequently of *light*, in warm countries, is very influential in modifying not only the vegetable and animal creation which inhabit them, but also many of the physical phenomena which contribute to the constitution of their climates. It would seem as if the solar beams were decomposed by the soil and its products, and, whilst furnishing heat and light to objects upon the surface of the earth, served to supply or to replace the locomotive electricity, which is constantly circulating through, and actuating, not only the crust of the globe, but also the vegetable and animal creations which cover it; passing thence, at last, into the atmosphere. Observation has clearly shown that electrical phenomena are most energetic, and of most frequent occurrence, in countries and in seasons in which the solar influence is the greatest; and that, while dryness of the atmosphere causes its accumulation in objects placed on the surface of the globe, a moist state of the air favours its passage thence, and its excessive increase in the clouds, giving rise to various meteorological phenomena. In a dry atmosphere, particularly in inland districts, thunder and lightning,—the more violent electrical changes occurring in this fluid,—do not take place; whilst vegetables and animals, as well as other bodies, placed on the earth's surface, are more than usually charged with electricity; whereas, in a warm and moist atmosphere, especially in maritime or insular situations within the tropics, these phenomena are very frequent, and the electricity is rapidly carried off from the earth.

6. It is evident that the annual quantity of rain in a particular district is very intimately connected with the nature of the climate; depending as it does upon the sources and amount of evaporation, and the prevailing winds. In the middle countries of Europe, the annual quantity of rain usually ranges from 12 to 18 inches. In the south-east side of this island, and in the vicinity of London, it commonly varies from 20 to 25 inches; whilst it is nearly double this amount in the western parts of Great Britain and Ireland; the greatest quantity falling in July, when the mean monthly temperature is highest, and the smallest quantity in February and March. As we advance towards the equator, the annual quantity of rain increases, chiefly in maritime countries, and parts in which ranges of high hills or mountains skirt the sea-coast, and varies from 80 to 120 inches. But the number of dry days is increased, particularly in districts situate inland; the greatly augmented quantity of rain falling at a particular season, and in a much shorter space of time than in colder regions. In cold or temperate maritime places, on the other hand, the rain descends in slighter showers, and much more frequently, although in much less quantity; leaving fewer dry, and occasioning more foggy and drizzling, days than in warm or inland countries.

7. *B.* Besides the foregoing, there are other circumstances which concur in forming the climate of a place. The chief of these are, the *nature of the locality*, the *soil*, the *abundance and exuberance of the vegetable creation*, the *state of cultivation*, the *prevailing winds*, &c. In the consideration of the *locality*, elevation above the level of the ocean, proximity to its shores, the vicinity of large rivers or lakes, the condition of the

surface, its elevation into hills or mountains, or depression into valleys or ravines, and the state of vegetation and cultivation, are the chief features that require notice. Places inland, which are elevated high above the sea, or the banks of large rivers or lakes, have their mean temperature diminished, in proportion to the elevation, much below those which, although equally far removed from the equator, are situate near the level of the ocean, or the bottoms of valleys; and the inhabitants thus breathing a drier, purer, and cooler atmosphere than in these latter localities, are more athletic, less subject to febrile diseases of a malignant or severe character, and reach more advanced ages. The influence of elevation above the level of the sea, and other circumstances of locality, upon the health of man, is chiefly shown in warm climates, and the more southerly of temperate countries. In the north of Italy, and in various districts in the south of Europe situate on the sea-coast, near the banks of lakes and rivers, and in low or narrow valleys, where a deep, moist, and rich soil abounds with organic substances in a state of decay, the air is humid, loaded with effluvia; is much more stagnant and dense; and, although the heat is moderated, as respects the extremes of its range, much within the limits to which it advances in elevated and inland parts, yet is it more oppressive, the atmosphere frequently being sultry and relaxing. Hence it is, that in these low situations the human frame is imperfectly or weakly constituted; a small proportion of the children born are reared; visceral and glandular diseases abound; and the mean duration of human existence is much shorter than in adjoining districts, which are either more highly elevated, or removed from the sources of contamination; and, from these districts, the diminution of the population of the former, continually occurring, is chiefly supplied. The East and West Indies, and the coasts of South and North America, furnish numerous illustrations of the influence of locality upon the climate, and thereby upon the constitution and health of the human race. So very different is the climate of Vera Cruz, and places in the vicinity, from other parts in the same latitude, but situated some hundred feet above the level of the sea, that the comparatively robust and healthy inhabitants of the latter are more subject to the endemic fevers of the former localities, when they visit them, than the natives; a continued residence having impaired the susceptibility of the inhabitants of the former places.

8. In the consideration of the soil, the geological and mineral relations of the place can scarcely be overlooked. In general, the older formations of rocks, and those of a homogeneous and compact nature, support a finer, a more deep, and more absorbent soil than the sandstone rocks and others, the *débris* of which form a coarse and gravelly substratum, through which the rain percolates and flows off, it not being retained in the surface to be evaporated, carrying with it into the air a portion of decayed vegetable and animal matter, as in the case of clayey, deep, absorbent soils, that yield by evaporation nearly all the rain which falls upon them. Whilst deep, rich, and moist soils, particularly near the banks or embouchures of rivers, on the shores of lakes, on



the sea-coast, and near its level, or in low confined valleys, or at the bases of mountains, especially in countries within 40° of the equator, are very productive of malaria; dry, sandy, or gravelly soils, somewhat elevated above or removed from the mouths and banks of rivers, and covering level, gently undulating, or moderately hilly places, are most salubrious. In northern and temperate regions, maritime places are equally healthy with inland districts, or even more salubrious, unless the latter be considerably elevated, possess a dry, well-cultivated soil, and be without marsh lands in their vicinity. But in warm climates, and even in many temperate countries, during warm seasons, places on or near the sea-coast are more productive of insalubrious exhalations than inland districts, owing not merely to their being more nearly on a level with the sea, and subjected to a denser and more moist atmosphere, but chiefly to the circumstance of the soil in such localities being more deep, rich, and absorbent; more liable to inundations from heavy rains or swollen rivers, and from the sea itself; more fertilised by the decay of vegetable and animal bodies; and hence more productive of the elements of unwholesome exhalations, when their extrication is favoured by a hot sun, and their retention and accumulation in the air are promoted by its more constant and greater humidity. Ravines, deep valleys, marsh grounds, the banks of rivers liable to exposure after inundations, the banks of lakes or canals similarly circumstanced; a soil profusely covered by succulent plants and other vegetable productions, and not reclaimed by cultivation, or but recently cultivated; grounds and soils exposed to the action of the sun, after having been long covered by an exuberant vegetation; the cultivation of rice, or other vegetable productions, which require occasional inundations or profuse irrigation; the partial admission of sea water, or its percolation through the natural embankments thrown up by the waves in low swampy parts of a coast; and the accumulation of dead vegetable or animal matter, of ordure, &c., in ditches, sewers, or drains, &c.; are the principal sources of those vapours and gaseous emanations which, being extricated by heat, and dissolved in the moisture of the air, act unfavourably upon the human constitution, and originate several of the most fatal diseases to which it is liable.

9. *C.* The cultivation of a country has also a marked influence upon the state of its climate. A district covered by a rank and exuberant vegetation — by extensive forests — is cold and moist, if situate beyond the tropics, its temperature and humidity being many degrees lower than that which a state of high cultivation would produce. A country similarly circumstanced within the tropics is also cooler and more moist than if it were cultivated; but the air is remarkably close and oppressive; and teems, as well as the soil, with the lower grades of animal creation, to the generation and nourishment of which its abundant wild vegetation chiefly contributes. Whilst the wooded and uncultivated districts of high latitudes occasion coldness and humidity of the atmosphere, abound in miasms from decayed vegetable matter, and produce the diseases usually proceeding from these causes, especially intermittents, catarrhs, rheumatism, pulmonary affec-

tions, &c., places covered by an exuberant vegetation within the tropics, particularly those near the sea-coast, and upon its level, abound with the effluvia arising not only from vegetable matter constantly in a state of decay, but also from animal exuviae, and the dead of myriads of insects and reptiles which infest these localities, and occasion malignant and remittent fevers, dysentery, and diseases of the abdominal viscera.

10. Although cultivation renders a climate warmer, drier, and more salutary, especially in temperate countries, yet for many years after the soil is cleared from its more bulky vegetable productions, and when it is first exposed to the action of the sun, especially in low latitudes, its endemic diseases often become more severe than even previously, and not infrequently assume an epidemic or pestilential form. The medical history of the West India islands and adjoining coast of America, as well as of the United States, furnishes numerous proofs of this position. The surface of the earth, previously in a great measure protected from the action of the sun's rays by the thick and exuberant vegetation that covered it, and the temperature lowered by a freer evaporation and transpiration from the leaves, yielded a less noxious effluvia than when entirely exposed to the sun's rays, and to the free action of air heated many degrees higher by the exposure. In its unreclaimed state, the noxious exhalations proceed chiefly from the decayed vegetable matter covering the soil, a great portion of which seldom rises above or extends beyond the higher foliage of trees; in its cleared state, the emanations are the product of the earth itself, and result from its richer constituents, and those elements of animal and vegetable matter with which a deep absorbent soil abounds, particularly in warm countries. The exhalations from the former source are more constantly and uniformly generated; but, from the latter, they are only occasionally formed, and require a concurrence of circumstances, especially a high range of temperature, a situation but little elevated above the sea, the vicinity of the sea-coast, and probably a certain degree of humidity of the air, and peculiar state of its electricity, for their generation.

11. *D.* Prevailing winds have much influence upon a climate. In Great Britain, and most countries forming the north-west of Europe, northerly and easterly winds are frequent during March, April, and May, owing to the current established to replace the warmer air, as it rises from the surface of the Atlantic and more southerly countries, now warmed by the sun as it passes to the northward of the equator. These winds are generally dry and cold, precipitating the moisture in fogs, and occasioning catarrhal, bronchial, pulmonary, and rheumatic affections, and, under certain circumstances, agues. During summer and autumn, southerly and westerly winds are most prevalent, and the air is more moist, owing to the temperature of the inland countries of Europe being now greater than the surface of the Atlantic; and to the air, loaded with exhalations from the ocean, rushing to replace the strata which are constantly rising from the heated surface of these countries, and depositing the moisture in the form of showers, &c. as it passes over the land; the hills, mountains, and places in their vicinity, which first attract the



clouds formed by the exhaled moisture, experiencing the greatest fall of rain. During November and December, northerly and easterly winds are again frequent, and the fall of rain is much increased. As the atmosphere receives or dissolves a portion of those fluid or gaseous substances with which it comes in contact, it is obvious that currents of air passing over the sources of the insalubrious exhalations enumerated above (§ 8.), will be more or less fraught with them. On the other hand, the air readily imparts a portion of those foreign substances dissolved in it, when brought in contact with bodies differently circumstanced. Hence it follows that prevailing winds, whether in northern, temperate, or warm countries, will have considerable influence on the climate, particularly in these last, for there the winds are generally most regular and constant, especially at certain seasons: places experiencing the sea breezes, and the winds which have passed over a dry and well cultivated country, being favourably circumstanced; but those exposed to currents of air from the sources of disease already referred to, being not much more fortunately placed than if they were immediately surrounded by insalubrious localities. In the case of towns, villages, or dwellings, thus situate, ill effects may be partly guarded against by planting double or treble rows of tall trees in such a manner as to intercept the noxious exhalations in their passage from the places in which they are generated. In this way the ancients protected their villas and towns from malaria; and it has been shown in modern times, that the foliage of trees attracts and absorbs these exhalations as they circulate through it, particularly at the season when they are most abundantly extricated from the soil.

12. Maritime places, in warm climates, and the more southerly of temperate countries, whilst they experience in the day-time, during the greater part of the year, regular sea breezes arising from the current of air replacing that which has been rarefied by the heated surface of the earth, are also subjected to land winds during the nights, owing to the less rapid evaporation and greater heat of the surface of the ocean at this time, the rapid radiation of heat from the soil soon reducing the temperature of its surface below that of the ocean in the same latitude. These winds are often fraught with effluvia, which, having been exhaled during the heat of the day into the upper regions of the atmosphere, are at night precipitated to its lower stratum, and are very productive of disease in those exposed to them. The currents of air that during the heat of the day passed from the ocean more or less loaded with moisture, return to it in the night, charged not only with humidity, but also with terrestrial emanations; thus rendering places situate in the vicinity of the sea, and nearly upon the same level, more insalubrious than the elevated districts inland. Numerous places in the East and West Indies, South America, and Africa, furnish illustrations of this principle, as well as various districts in North America, and in the south of Europe, particularly those on the shores of the Mediterranean.

13. *General view of the subject.*—From the foregoing, therefore, it will be seen that the word *climate* embraces not only the temperature of a country, and the phenomena which depend upon

the distribution of heat, but all the modifications of the atmosphere by which our organs are sensibly affected, particularly states of humidity, variations of barometric pressure, changes of electric tension, the admixture of gaseous emanations or substances dissolved in the atmospheric moisture, clearness and serenity, and tranquillity as respects both horizontal and vertical currents. All these exert a powerful influence, not only upon the development and health of the vegetable and animal structures, but also upon the sensations, the intellectual endowments, and the moral emotions of mankind, in the different regions and zones of the world. Comparatively few of these atmospheric changes can be ascertained otherwise than by a long series of attentive observations; and these have been made only at a few parts of the earth's surface; and hence, as remarked by an able writer, though we know with some precision the general circumstances which modify the distribution of heat, we are still imperfectly informed as to the influence of local causes of deviation from the mean state that would be attained if the surface of the earth were perfectly regular, and its power of absorbing and emitting heat and light were every where the same. Europe and Asia are contrasted with each other in respect of many of the circumstances which affect their climate. In a general view, Europe may be regarded as being almost a peninsula, broken, moreover, and intersected by numerous arms of the ocean and inland seas. Owing to the causes already alluded to (§ 11.), the predominating winds are from the west, and these, for the whole of the western portion of this quarter of the globe, are sea winds softened by passing over a mass of water, the temperature of the surface of which, even in the month of January, under the mean parallels of 45 or 50 degrees, does not fall below 48° and 52° of Fahrenheit. Europe has also the advantage of being placed to the north of immense tracts of tropical land, which, by its diurnal radiation, produces effects very different from an equal superficies of ocean. Masses of heated air are constantly rising from the arid surface to the higher regions of the atmosphere, and are impelled towards the colder countries of the north. On the northern side of this quarter, circumstances are unfavourable to the accumulation of extreme cold; for a very small portion of land is placed beyond the polar circle, and the whole northern extremity is separated from the polar ice by an open sea, the temperature of which is very much higher than that of a continental country in the same latitude. The comparatively high temperature of the sea on the north of Europe is chiefly to be ascribed to the direction of the great oceanic valley which separates Europe from America, and the existence of the gulf stream; the inter-tropical Atlantic waters flowing from the Gulf of Mexico into the polar seas.

14. The circumstances which thus contribute to render the climate of Europe mild, do not exist in respect of Asia, or even of America. Their northern boundaries extend to the winter limit of the polar ice. The north winds, unobstructed by any chain of mountains, blow with unmitigated fury over icy plains extending northward to the pole, and eastward to the point of maximum cold, which, according to HUMBOLDT



and others, seems to be situate near the meridian of Behring's Straits. The refrigerating effects of these winds are not counterbalanced by burning deserts on the southern side of these continents; or, as respects Asia, by any great extent of land placed below the equator; consequently the Asiatic countries situate in the temperate zone, more especially, are not warmed by ascending currents of heated air, such as those which arise from the deserts of Africa, and are so beneficial to Europe. The position of the great mountain chains of Asia, and the elevation of the country, also contribute to diminish the temperature, they presenting a barrier to the warm winds from the equatorial regions. Elevated plains and groups of lofty mountains accumulate and preserve the snow till late in the summer, and give rise to descending currents of air, which cool the circumjacent countries. Asia, moreover, in the whole extent of Europe, has no sea on its western side; consequently the west, or predominating winds, are, for the greater part of this quarter, land winds; and their severity is increased by the great enlargement of the land towards the north. These circumstances occasion remarkable differences in the climates of Asia and the western countries of Europe. The eastern part of the latter, however, nearly assimilates with the western districts of the former; and, with the whole of it, to the north of the 35th degree of latitude, has a climate in which the temperatures of summer and winter are widely different from the mean temperature of the year. At Moscow (lat.  $55^{\circ} 45'$ ), where the mean temperature of the year is only  $40^{\circ}$  Fah., the mean temperature of the hottest month is  $70\frac{1}{2}^{\circ}$ ; while at Paris (lat.  $48^{\circ} 50'$ ),  $7^{\circ}$  farther south, where the mean temperature of the year amounts to  $51^{\circ}$ , that of the hottest month is only about  $65\frac{1}{2}^{\circ}$ . In no part of the world, not even in Italy or Madeira, do finer grapes come to maturity than at Astrakan, on the borders of the Caspian; and yet at the same place, or even still farther south, under the latitude of Avignon and Rimini, the thermometer falls in winter to  $18^{\circ}$  and  $22^{\circ}$  below the freezing point. On the western coast of France, in the latitude of  $48^{\circ}$ , the mean temperature of the year is the same as at Pekin, the latitude of which is only  $40^{\circ}$ ; while the temperature of the winter months is  $14\frac{1}{2}^{\circ}$  higher in the former.

15. The mean temperature under the equator is not precisely determined; but HUMBOLDT thinks it does not exceed  $80^{\circ}$  of Fahrenheit. The greatest summer heats are found in countries contiguous to the tropics. On the Red Sea, for instance, and in Arabia, the thermometer is often seen to rise to  $110^{\circ}$  at mid-day, and to remain at  $94^{\circ}$  during the night. A few degrees within the tropics, the sun at midsummer continues for a considerable time to pass daily very near the zenith; and the day, increasing with the latitude, is longer than under the equator; so that the amount of nocturnal radiation is diminished. Among the local causes which contribute to give an excessive temperature to the Arabian peninsula and the north of Africa, the sandy surface almost deprived of vegetation, the constant dryness of the air, the direction of the winds, and the quantity of heat radiated from earthy particles carried about in the atmosphere, are the most prominent.

16. II. INFLUENCE OF CLIMATE ON THE HUMAN CONSTITUTION. — From what has been already adduced, the action of climate on the human frame must be admitted to be extremely complex; the ultimate result arising chiefly from the combined operation of heat, light, electricity, atmospheric pressure, the various emanations arising from the soil, and the productions, vegetable and animal, constituting the food of man. The human species is, in many respects, moral as well as physical, moulded by the climate and soil which he inhabits; and, by this pliability of his functions, under the influence of atmospheric and other vicissitudes, is the only animal that is truly cosmopolite. In considering the influence of *climate on man*, it will be advantageous to view it, *first*, with reference to extensive communities and races of the species; *secondly*, as respects the nature of the food which different climates provide for the uses of man, and its co-operation with the climate in modifying the human frame, and counteracting the effects of rigorous seasons, and the unfavourable influences to which it is exposed in arctic and tropical regions; and, *thirdly*, as regards the changes produced in individual constitutions after migrating from one climate to another. Neither the limits nor the scope of this work will permit me to consider these subjects in all their relations; I must, therefore, confine myself to such topics as have an evident and important bearing upon practical medicine — in respect either of the causation and nature of disease, or of rational methods of cure.

17. i. CLIMATE IN RELATION TO THE VARIETIES OF THE SPECIES AND THEIR PREVAILING DISEASES. — Although man is more readily assimilated with particular climates than any other animal, yet this faculty is not equally possessed by all the varieties of the species and the natives of every latitude. It is more particularly manifested by the inhabitants of temperate climates; probably owing to their greater vital energy, and to their habitual exposure to alternate extremes of temperature and of season. The natives of polar regions on the one hand, and of tropical countries on the other, possess it in a much less remarkable degree; and not only are they speedily cut off by removal from the one climate to the other, but they often suffer greatly from a residence in temperate countries. It should not, however, be overlooked, that man, like many of the individuals below him in the scale of creation, often derives advantage from a change of locality; provided that the change is not made to opposite climates, but to districts of equal or greater salubrity.

18. It has long been a matter of dispute whether the differences, intellectual and physical, presented by the various races of man, have arisen from the continued, slow, and imperceptible operation of climate; or have been originally impressed upon the species. The evidence and arguments connected with this subject fall not within my province. But it is of importance to the practical physician to note what those peculiarities are, that characterise the different races of man; and, whether they be the result of climatorial influence or of original conformation, to consider them in connection with the climates to which we find them more particularly appropriated in the survey of man in his distribution over the globe.



However cursory this survey may be, there are certain facts of the utmost practical importance to every one who entertains philosophic ideas in medicine, which should not be overlooked; namely, that the slow and continued operation of a particular climate actually changes the human frame in many respects to that state which its indigenous inhabitants present; and that the constitution, thus assimilated, is necessarily the best suited to the external influences to which it is exposed, and the food furnished by the soil of which it is the native. There are, however, certain characteristics, especially those which distinguish the *Æthiopian* and *Mongolian* varieties, that a succession of ages has not been sufficient to impart to different races which had migrated to the climates they inhabit; and which must, therefore, be imputed to original conformation.

19. *A. The effects of great cold, and of the privation of solar light*, during nearly two thirds of the year, upon the human frame, are observable in the stunted growth and the weak muscular power of the *Samoied*, the *Ostiaks*, the *Esquimaux*, the *Greenlander*, and the *Laplander*, compared with the inhabitant of temperate climates. In the arctic regions, the human body, like many of the lower animals, and the productions of the vegetable kingdom, rarely reaches that state of development it presents in temperate countries: the features and stature retain an appearance of boyhood or youth, almost until marks of age appear; the complexion is greyish; the head flat, the face broad, the eyes far apart, and the whole figure squat and unattractive. Female pubescence, however, according to the accounts given by *LINNEUS*, *HUMBOLDT*, *LYON*, *PARRY*, and *FRANKLIN*, as indicated by the accession of the catamenia, is not delayed beyond the period usual in temperate countries — most probably owing to the premature excitement of the generative organs in the unrestrained intercourse of the sexes, that takes place at an early age. To this cause, also, is to be imputed the circumstance of their females being less prolific than those of temperate climes; whilst, in these races, the instinctive feelings which tend to the preservation of the individual and of the species are sufficiently strong, the intellectual endowments and moral sentiments are remarkably torpid. The benumbing influence of cold, and of the privation of solar light, is also manifested in the functions of the nervous and sanguiferous systems. Diseases generally assume among them an asthenic form; fevers being of a low type, and sthenic inflammations of rare occurrence. As long as the natives of arctic regions remain in their own countries, they are exposed to but few causes of disease besides cold, the scarcity of provisions, occasional excessive repletion, and various contagions. The soil being almost constantly frozen, even during summer, at the depth of a very few feet, deleterious emanations seldom or never issue from it; but infectious maladies, when once introduced, become extremely destructive, and several of them often very prevalent, owing to their low, small, and unventilated dwellings, and their want of personal and domestic cleanliness. When, however, they migrate to more temperate and southerly regions, they are very liable to febrile and sub-inflammatory diseases, arising from increased temperature, the vicissitudes of season, and other novel causes to which

they become exposed: whilst their maladies seldom require, their constitutional powers can but ill tolerate, a lowering treatment, or large sanguineous depletions.

20. *B. Although extreme and continued depression of temperature produces the above effects, more moderate cold, particularly when alternating with a temperate summer heat, promotes the development of both the body and mind.* Countries situate between  $45^{\circ}$  and  $63^{\circ}$  of northern latitude are inhabited by the most robust and enduring of our species, in respect of both physical and intellectual powers. It may be stated in general of the northern temperate zone, that the inhabitants of its more southerly countries have made the earliest advances in civilisation, and that those of its middle and more northerly climates have carried the useful arts and sciences to the highest perfection. Within the range of this zone, man presents the greatest diversity of temperament, of constitution, and mental endowment. Muscular frames, plethoric habits of body, and the sanguine temperament, predominate among the natives of the more northerly of temperate climates, particularly as regards Europe and its western countries. Affections of the chest and respiratory organs, inflammations, fevers complicated with inflammations of the lungs or of the brain, and rheumatism, are the most prevalent diseases. Epidemics assume most frequently amongst them a phlogistic character: and vascular depletions are more required, and better borne, in the treatment of their maladies. Climates which are the most variable, as to both the commencement and the course of the different seasons, are, notwithstanding the many disadvantages imputed to them, the most favourable to the advancement of the various bodily and mental powers. The rapid and frequent vicissitudes of weather preclude, as respects the community generally, the regular adoption of means to guard the body against their operation: consequently the frame becomes habituated to their operation, and thereby fortified against the injurious impressions which would be otherwise made by them. That countries thus circumstanced are benefited rather than injured by this state of weather and season, is shown by the robust frames, the mental activity, and the longevity of their inhabitants. The physical and moral history of the *British Isles*, *Denmark*, *Sweden*, and the more continental districts of western Europe, demonstrate this fact. In the eastern countries of this quarter of the globe, as well as in *Central Asia* and in *North America*, the seasons being much more regular in their advent and in their course, measures are more regularly and uniformly adopted to moderate the extremes of temperature and the vicissitudes of weather; and these have, in many instances, the effect of enervating the frame, of promoting the extension or prevalence of disease, and of thereby diminishing the mean duration of human life. Of this description is the use of excessively warm clothing, and of stoves, which overheat the air of the apartments, without renewing it so rapidly as is often requisite to the wants of the economy. Hence, whilst the external atmosphere is cold, dry, and invigorating to the healthy frame in a state of activity, the air in-doors is close, warm, and depressing; the frequent alternation from



the one to the other, or the constant residence in the latter, being injurious even to those in health, and causing diseases of the thoracic and abdominal viscera.

21. While the natives of northerly inland countries suffer more especially from the extremes of temperature and of season, and the circumstances which arise out of them, they are less exposed to emanations, arising chiefly from the decomposition of vegetable and animal matter — to those endemic sources of disease that produce so much suffering and mortality in low or level districts, and in more southerly climates, where the atmosphere is moist and warm. The inhabitants of temperate countries considerably elevated above the level of the sea, and of mountainous places, are generally of a spare, firm, and muscular habit of body, and strongly formed; chiefly owing to their active and industrious modes of life, and the pure and light state of the air they breathe. The irritable, sanguine, and nervous temperaments, and quick, irritable, and generous dispositions; predominate among them. Inflammatory, hæmorrhagic, and spasmodic diseases, particularly hæmoptysis, bronchitis, consumption, asthma, inflammations of the lungs and pleura, rheumatism, and disorders of the circulatory organs, are most common. Their females are more virtuous and prolific, and the mean duration of human life longer, than amongst the natives of lower districts and warmer climates.

22. *C.* There are certain peculiarities in the natives of temperate countries, particularly of European countries, that must strike the pathologist as intimately connected with the nature and treatment of their diseases. These are chiefly the complexion of the skin, the large developement of the respiratory, biliary, nervous, and circulating organs, compared with those of the natives of intertropical countries. The skin of the dark races is not only different in colour, but is also considerably modified in texture, so as to enable it to perform a greater extent of function than the more delicately formed skin of the white variety of the species. The thick and dark *rete mucosum* of the former is evidently more suited to the warm, moist, and miasmatic climates of the tropics, than that with which the latter variety is provided. The skin of the negro is a much more active organ of depuration than that of the white. It not merely exhales a larger proportion of aqueous fluid and carbonic acid from the blood, but it also elaborates a more unctuous secretion, which, by its abundance and sensible properties, evidently possesses a very considerable influence in counteracting the heating effects of the sun's rays upon the body, and in carrying off the superabundant caloric. Whilst the active functions, aided by the colour, of the skin, thus tend to diminish the heat of the body, and to prevent its excessive increase by the temperature of the climate, those materials that require removal from the blood are eliminated by this surface, which, in the negro especially, performs excreting functions very evidently in aid of those of respiration and of biliary secretion. In the white variety of the species, on the other hand, the functions of the lungs and liver are much more active than in the darker races, changes to a greater extent being performed by respiration in the former than in the latter, as I have proved by experiment.

The liver is also larger, and its secretions more copious in the European than in the negro or Mongol.

23. In the inhabitants of northern climates, and elevated or cold countries, the functions of the lungs and kidneys are extremely prominent, and those of the skin and liver much less so; eliminating or depurating actions on the blood being performed chiefly by the former organs. But, in the natives of intertropical climates, the skin assumes, as shown above (§ 22.), a more extensive function, and, by its activity, compensates for the diminished operation of the lungs, liver, and kidneys, generally observed among them, aided, no doubt, by the secretions from the intestinal mucous surface. In temperate countries, the various emunctories of the frame present a degree of activity in strict keeping with this general connection of climate with the developement and activity of these functions. In the warmer districts of temperate climates, and especially in those which are subjected to a dense, moist, and miasmatic atmosphere, the changes produced by respiration are diminished, and those effected by the cutaneous and intestinal mucous surfaces are increased. If the natives of such districts belong to the white variety of the species, their cutaneous surface not being constituted so as to enable it to perform the compensating action for which the skin of the darker races is destined, a different organ performs this office, and the liver assumes an increased action, combining and eliminating several of the effete constituents or elements as they accumulate in the circulation, and thereby giving rise to an increased and modified biliary secretion.

24. *D.* If we compare the organisation and functions of the negro (and I may add, of the Mongol) with those of the European, the following general results will appear, and, together with what has been now advanced, will serve as the source of very important pathological and therapeutical inductions: — The circulating organs, the lungs, the liver, the middle and anterior lobes and convolutions of the brain, the muscles, and the bones, excepting those of the head and face, are very evidently smaller, and their functions less prominent, in the former than in the latter variety; whilst, on the other hand, the skin and its functions are much more developed. With the activity of function, conjoined with frequent exposure to the action of numerous excitants, the disposition to, and occurrence of, disorder increase; and, accordingly, diseases of the lungs and circulating organs, of the liver, and of the nervous system, predominate in the white races of man; and chronic affections of the skin, and those acute maladies which chiefly attack this surface and the intestinal mucous membrane, in the dark varieties of the species. Amongst the latter, fevers are not common; and when they occur, they are usually slight, terminate speedily, seldom assume an inflammatory or continued type, often pass off with critical discharges from the skin or bowels, and not infrequently lapse into a state of low or chronic dysentery. The exanthematous diseases generally assume in them a severe and asthenic form, and rapidly spread by infection. Verminous disorders are very common in them; but affections of the brain and its membranes, and of the teeth, are extremely



rare; the cranial contents seldom suffering materially in the course of febrile attacks. The remarkable thickness of the bones of the head, in nearly all these races, protect the membranes and brain from the causes of disorder to which they are liable; and the continued exposure of the head to the action of the sun and air, the absence of mental culture, and their modes of life, by no means dispose these parts to disease. Inflammations, particularly those of a sthenic character, are very rare; and, if vascular excitement attend the early stage of these maladies, it soon exhausts itself and passes into the opposite extreme. Disorders, which consist chiefly of morbidly increased discharges, from deficient tone of the extreme vessels, and those of a spasmodic form, are not uncommon.

25. *E.* The organisation of the dark races of man, chiefly as respects the state of vascular action and tone, the developement of the viscera already referred to (§ 22—24.), their food, modes of life, excessive addiction to venereal indulgence, the continued influence of a moist and miasmatic atmosphere, and the characteristic features that their diseases consequently assume, generally preclude the employment of large vascular depletions. During the progress of febrile and exanthematous maladies, critical evacuations from the skin and intestinal mucous surface frequently occur, the latter of which are very apt to assume a colliquative or chronic state, and, if not judiciously controlled, to carry off the patient. Hence the propriety of employing free evacuations of the *prima via*, with warm diaphoretics, at the commencement of their diseases, and of supporting the energies of life in the advanced stages. The circumstances now referred to as modifying the constitution and diseases of the dark races of our species, should never be overlooked when devising plans for treating them. Nor should the fact be neglected, that worms, especially lumbrici, in the intestinal canal, are very frequently connected with the origin of many maladies of remote but related organs. Affections of the stomach, diarrhoea, colicky pains, leucorrhœa, various spasmodic and convulsive disorders, chronic dysentery, &c. very often arise from this cause; and, no more than the cause itself, will ever be permanently removed, in these races especially, by evacuations alone, but by combining them with stimulants, tonics, and antiseptics. Although both the habits and modes of living of the dark races, and the constitution of their digestive organs, require the occasional use of active purgatives, in order to remove the saburra and colluvies which so rapidly collect on the intestinal mucous surface, yet those medicines should generally be combined or alternated with substances which exert a cordial and tonic influence, as their vital energies soon sink under frequent evacuations when deprived of an accustomed or requisite stimulus. (See *Art. DISEASE.*)

26. ii. OF THE FOOD OF MAN IN RELATION TO CLIMATE AND THE CONSTITUTION OF THE VARIETIES OF THE SPECIES. — The intimate relation which subsists between the food of man, and the nature of the soil and climate which he inhabits, and the combined operation of both upon his constitution and the character of his diseases, have seldom been considered in a manner deserving of the subject.

Man, although in some measure independent of the nature of the soil or climate in which he lives, is yet, in several points of view, the creature of both. His manifestations, both moral and physical, are moulded by both influences, like the animals which are below him in the scale of creation, although generally in a much less degree. It is the soil that furnishes him food, and the air which he respire derives much of what is noxious to his frame from that source. Whenever, therefore, the natural history and diseases of man come under consideration, they should be viewed in relation to those productions of the soil on which he subsists — with which, in many respects, he may be considered as a fellow product, but holding a superior station, and by which are often caused many of his ailments. As it is beyond the scope of this work to enter fully into the very interesting considerations which this subject involves, I can only point to its more general connections; and I do this more with a view of directing the attention of others to the subject, than of satisfying my own wishes as to its discussion.

27. As the physical and intellectual powers of man enable him to occupy the whole surface of the globe, it follows that he cannot be restricted to any particular kind of food — in other words, he must be naturally omnivorous, as a consequence of his ubiquity. If the wastes of Lapland, the shores of the icy sea, the frozen coasts of Greenland, and the deserts of Terra del Fuego, were destined by nature for the habitations of man, then is he not an herbivorous animal; nor is even a mixed diet necessary for his support. It would be impossible to procure vegetable productions where the earth's surface is almost constantly either frozen or covered with snow. The continual use of animal food is as natural and wholesome to the Esquimaux, as a mixed diet is to an Englishman. The Russians who winter on Nova Zembla, according to Dr. AIKEN, imitate the Samoïeds, and eat raw flesh and drink the blood of the reindeer, in order to preserve their health in these arctic regions. The Greenlander devours, with good appetite, the raw flesh of the whale, or the half frozen and half putrid flesh of seals; and drinks the blood of these latter animals, or regales on dry fish and whale-oil.

29. Within the tropics, man is subjected to the continued operation of a high temperature, which excites the nervous functions and vascular action, notwithstanding the provision with which nature has furnished his integuments in order to moderate the animal heat. This provision, as we have seen, consists chiefly of the dark colour of the *rete mucosum*, which speedily gives off the superfluous heat of the body, and of the great activity of the perspiratory functions (§ 22.). Intertropical countries, particularly such as are low or swampy, while they abound with the productions of the vegetable kingdoms, and with numerous swarms of insects and reptiles, maintain very few of those gregarious animals which serve as food; and thus, we perceive that their inhabitants, unless in elevated and cool situations, as in Abyssinia, Mexico, &c., are obliged, by the scarcity of these animals, to subsist on vegetable productions, and to adopt a system of religion, which, while it tends to prevent the entire destruction of the more useful species, is sufficient



to restrain their numbers within their appropriate means of subsistence, and without encroaching on or impairing the supply of food with which the vegetable creation furnishes man. Hence, in many places of intertropical Africa, the lower animals, whose numbers are few, are occasionally made sacred by the priests for a time; and in other places of this continent animal food is very rarely enjoyed. In Hindostan, the natives are almost debarred from the use of flesh meat; and the cow is made sacred, evidently to prevent the destruction of a species, whose milk furnishes man with one of the chief articles of diet.

29. But nature provides a more suitable aliment to the inhabitants of those climates. The date, the palm tree, the cocoa-nut, the sago tree, the plantain, the sugar-cane, and the banana; the yam, cassava, ground-pea, and other roots; a great variety of refreshing fruits; and, more particularly, the very abundant production of nutritious grains, especially the Indian corn and rice, richly supply the natives of these climates with wholesome food. The general and necessary adoption of a vegetable diet within the tropics, from the exuberance of the vegetable creation, and the comparative scarcity of those gregarious animals chiefly destined for the use of man in cold and temperate regions, is necessary to the existence of the human species in the higher ranges of temperature, and in the more unhealthy districts in hot climates. The adoption of animal diet exclusively, or of too large a proportion of it, disposes the human frame, when exposed to the influence of tropical heat, to those diseases which arise from endemic causes, — viz. the decay of vegetable and animal matters, the exhalations of marshy and absorbent soils, and other emanations accumulated in moist and close situations; and to those which affect the alimentary canal and other abdominal viscera. Various epidemic diseases also often produce their greatest havoc, and assume pestilential characters, amongst those, who, to the predisposition occasioned by a high range of temperature, have superadded that arising from a too full animal diet. It appears to be a salutary law of nature, that, in those climates, where animal food would be detrimental to the human race, there the animals usually destined for the purpose are few in number, and stunted in growth. The localities, indeed, which are the most destructive to man, are also the most inimical to these animals, which, if they were chosen as the chief article of food, would both dispose to disease and increase its fatality. Thus it appears, that the distribution of the classes of animals over the surface of the globe is so apportioned, and certain of their orders and genera so restricted to particular latitudes and climes, as to be subservient to the wants of man, without becoming hurtful, or endangering his existence in countries in many respects unfavourable to his bodily and mental development.

30. While the vegetable diet, which the hottest and most unhealthy climates furnish, is the least liable to excite the nervous system, or to overload the circulating and secreting organs, or to irritate and inflame the excreting viscera, it serves to promote endurance, and, with the hot spices which grow spontaneously in the same localities, to counteract the contaminating changes produced in the body by the vegeto-animal

effluvia to which it is frequently exposed. In both Indies, and in intertropical Africa, the inhabitants of low and moist situations live almost exclusively on rice and maize; with these they consume, as a condiment, a very large quantity of the hottest spices, the stimulating and tonic qualities of which preserve them from the effects of the diminished temperature and terrestrial emanations during, and after, the rainy seasons and monsoons, and in some measure from intestinal worms and other parasitic animals. To these spices, even the feathered creation, and the lower animals, occasionally resort, especially during the unhealthy seasons. Were the inhabitants to live chiefly on animal food, and use the strong fermented liquors made in colder climates, the nervous and vascular systems would be inordinately excited, irritability being thereby soon exhausted; and they would be as much disposed to, and affected by, disease, as unseasoned Europeans, who, partly owing to these causes, so soon become its victims, after having removed to low, moist, and hot situations between the tropics. Nature adapts her productions in every climate to the necessities of man; and appropriates them to his real, but not his imagined wants, — to his state of constitution, as modified by the operation of soil, air, and temperature; and nowhere is this provision more manifest than in warm countries. There, if the causes of disease be most energetic, as they most indisputably are, she has chiefly restricted them to those which proceed directly from the soil and the climate, while she has confined those arising from the nature and the abuse of food within narrow limits; as there man is destined, by the circumstances already alluded to, to live chiefly on a vegetable diet, and is liable only to occasional deficiency of its supply. But even the inflictions which nature thus imposes on the inhabitants of these climates are accompanied by abundant means of preventing their invasion, or arresting their progress. The most unhealthy situations not only abound with suitable means of subsistence, but also present spontaneously the most efficacious prophylactic and curative agents for the diseases that are endemic in them. Thus rice, the banana, the plantain, the juice of the cocoa-nut and of the palm, the oil of the palm-nut, &c., are the most wholesome articles of food in the districts wherein they are most abundant. The low grounds on which these are produced abound with deleterious miasms; and the stagnant water, which there often serves for the necessities of life, contains the ova of insects and animalculæ. While the former occasion agues and remittents, the latter gives rise to diseases of the digestive canal, and to the generation of worms; and both causes combine to produce fevers, diarrhoea, dysentery, cholera, visceral obstruction, &c. In the above localities grow the different species of the *capsicum*, — the principal condiments employed by the natives; and these are also the chief prophylactics and remedies for their constitutions, against the diseases now alluded to. By the side of the palms and the cocoa-nut grow the different species of the tamarind and the croton, which are, respectively, the mildest and most cooling aperient, and the most active cathartic. Thus nature provides an antidote to the bane which is imposed on the inhabitants of



unhealthy warm climates, and, by adopting the indications she presents, they are enabled to exist without suffering much more from disease than the natives of temperate countries, or having the allotted span of human existence much abridged. It is in no small measure owing to his persisting in the diet, beverages, clothing, and modes of living, suited to a cold or temperate climate, and to which he had become accustomed, that the European is liable to disease when he has removed to a hot country. When travelling in the most unhealthy parts of intertropical Africa, in 1817, I met with an Englishman, who had lived there between thirty and forty years, and was then in the enjoyment of health. The circumstance was singular; and, in answer to my enquiries as to his habits, he informed me, that soon after his removal to that pestilential climate his health had continued to suffer, when, after trying various methods without benefit, he had pursued as closely as possible the modes of life of the natives, adopting both their diet and beverages, and from that time he had experienced no serious illness.

31. In countries approaching the poles, where the continued low temperature, and the want of solar light during two thirds of the year, tend to diminish nervous and vascular energy and tone, and to lower the whole circle of vital actions, nature has furnished man with those articles of food which are the best calculated to nourish, to stimulate, and impart vitality to the frame, and thus to enable it to bear up against the rigour of the seasons, and the injurious influence of the climate. Without such food, the inhabitants of arctic regions would fall a prey to diseases of debility, and the higher latitudes would soon become entirely depopulated. In these, as well as in northerly and elevated parts of temperate countries, nature spontaneously provides man with those substances which are the most energetic, both as preventives and as remedies of those diseases which arise from the influence of climate. The various species of pine abound in the coldest regions, and furnish, in numerous forms, the most efficacious internal and external medicines, and even the most wholesome beverages in these maladies. Hæmorrhagic diseases, low fevers, asthenic inflammations, scorbutic and cachectic affections, the extreme effects of cold upon the extremities, &c., are most successfully prevented or treated by the judicious use of terebinthinate preparations. This observation is also applicable to the *arnica montana*, and other alpine plants.

32. The temperate zone, whilst it furnishes in its wide range the greatest diversity of climate — in some localities that of the tropics, in others that of arctic regions — provides man with the greatest abundance of animal and vegetable food: thus enabling him to combine both, or to adopt more or less of either, according to the nature of the seasons, of the climate, and the particular circumstances in which he may be placed. Nature is always provident: she takes sufficient care that each particular district or country shall have within itself, or be capable of producing by requisite labour, those articles of food which are most appropriate to the climate, and thereby the most wholesome to its inhabitants. When commerce or manufactures increase the population of a district beyond the means of sustenance derivable from the soil, and lower animals, in the vicinity,

the food which is obtained from a similar climate is generally the most wholesome. Various disorders originate from the introduction, from remote countries, of unsuitable articles of luxury into diet; and not a few arise from the improper mode of preparing food, which would otherwise be wholesome. Thus, the hot spices and the high-seasoned dishes, which, during the tropical rains, would be beneficial to the natives of those climates, who live chiefly on vegetable diet, frequently are productive of disease amongst those who partake too freely of animal food, or the high-feeding inhabitants of commercial cities. The adoption, also, of highly seasoned dishes, with an undue quantity of flesh meat, — undue, because exceeding the wants of the economy, and the circumstances of the climate, — and the use of spirituous and fermented liquors, are fertile sources of disease, particularly fevers and affections of the abdominal viscera, among Europeans residing in warm places or during warm seasons.

33. From these and other considerations the following corollaries may be drawn: — That the climate of a country should, in a great measure, guide man in his selection of food; those productions which are most abundant around him being most appropriate to the circumstances in which he is placed: and that the nature of his food thus conspires with the climate to modify his constitution, whilst it serves to counteract the rigours of season, and the unwholesome influences to which he is constantly exposed in very hot as well as in very cold countries.

34. iii. OF THE EFFECTS PRODUCED ON THE HUMAN CONSTITUTION BY CHANGE FROM ONE CLIMATE TO ANOTHER OF A VERY DIFFERENT OR OPPOSITE DESCRIPTION. — By referring to what has been already advanced respecting the physical relations of climate, and the circumstances more immediately connected with cold and warm countries respectively, and by connecting these with the peculiarities characterising the races of man inhabiting both, we shall readily perceive that a most important revolution will take place in the animal frame from the change, in whichever direction it may be made; and that such revolution will be great in proportion to the suddenness and greatness of the change; it being in either case attended with more or less febrile commotion or other diseased action.

35. 1st. *Of change from a cold or temperate to a warm climate.* — A. Keeping in view the following characteristics of a cold and temperate climate — viz. its low temperature, the alternations of season, the pureness of the atmosphere, the more nutritious, invigorating, and stimulating nature of the food, and the effects of warm clothing — and connecting these with the vascular plethora, the active functions of the brain, lungs, liver, and kidneys of its inhabitants, the disturbances which will result when they are subjected to a continued high range of temperature, and to an atmosphere loaded with moisture, and frequently with vegetable animal effluvia, may be anticipated. It is now fully ascertained that the effects of a high range of temperature, and of moist miasmatic air, on the European constitution, are, a diminution of the changes effected by respiration on the blood, an increase of the secreting and excreting functions of the liver and skin, and a decrease of the urinary excretion. When, therefore, the plethoric



European migrates to an intertropical country, the functions of the lungs and the pulmonary exhalation become diminished; the requisite changes are not effected on the blood, notwithstanding the excitement of the nervous and vascular systems by the increased temperature; and the already active and developed liver is irritated, and has its functions augmented, by the increase of those elements in the blood, that the lungs and skin cannot remove from it. Hence proceed febrile attacks, particularly when excited by their appropriate causes; inordinate activity, with a relative frequency of the diseases, of the liver; the secretion of acrid bile; and the disorders especially affecting the alimentary canal and excreting organs. The general adoption of too rich and nourishing food and beverages by those who remove from cold to hot climates, tends greatly to increase these evils, as already explained (§ 30.); and the influence of high temperature and of a vertical sun upon the European head is productive of disease both of it and of the liver. To these effects, the mental cultivation and activity of Europeans somewhat predispose them; whilst their heads are not so well guarded from external influences by the constitution of its integuments and hair, and the thickness of the cranial bones, as those of the negro and Mongol varieties of our species.

36. The obvious indications resulting from these facts are, that natives of cold countries migrating to warm climates should, particularly if the change has been made abruptly, live abstemiously, and promote the functions of those organs which perform the most essential part in excreting effete or injurious elements from the circulation. The head should be kept cool, and protected from the rays of the sun; the surface of the trunk and lower extremities ought to be preserved in a freely perspirable state, so as to take off the load of circulation, and derive from the excited liver. In order to promote the secreting and depurating functions generally, active exercise, short of fatigue, should be taken, without exposure to the causes of disease, particularly those which are endemic. As the maladies which most frequently supervene on change from a cold to a warm climate proceed neither from the increased temperature alone, nor from greater moisture of the air, but from these conjoined with malaria, and not infrequently also with wide ranges of temperature during the twenty-four hours, especially in high and inland localities—with hot days, and cold, raw, and dewy nights, and with a too full and exciting diet and regimen, causing fevers, dysentery, and diseases of the biliary organs—care ought to be taken to avoid those causes, as well as whatever may tend to assist their operation on the frame, and to protect the system against the sudden daily changes by warm clothing at night, &c.

37. *B.* The consideration of the effects produced by migration, during a state of disease, from a cold to a warm and moist climate, is of the utmost importance. Keeping in mind its influence upon the healthy frame—chiefly in exciting the functions of the skin and liver, and diminishing those of the lungs—we are led to prescribe it in the treatment of various diseases. In *hæmoptysis*, this change is obviously beneficial, especially as a warm and moist atmosphere, by this mode of

operation, lessens the activity of the pulmonic circulation and the disposition to sanguineous exudation from the surfaces of the bronchi. *Bronchitis* and *tubercular phthisis* are also often benefited, and the progress of the latter much delayed, by this state of atmosphere, especially when adopted early. *Chronic rheumatism* is sometimes cured by this change, seemingly owing to its influence in promoting the biliary and cutaneous functions. *Dropsies*, particularly *anasarca* and *hydrothorax*, have been, in a few instances, removed by a change to a warm climate; but whilst a moist state of the air is most serviceable in pulmonary and hæmorrhagic diseases, dry warmth seems more beneficial in dropsies, dyspeptic affections, and hypochondriasis, evidently from its effects in augmenting the insensible perspiration and the pulmonary exhalation, and imparting tone to the capillary circulation. Besides these, *gout*, in its early stages, *dysmenorrhæa*, and *scrofula* in nearly all its forms, are benefited by a change to a warm, or even a mild and dry, atmosphere.

38. 2d. *Of migration from a warm to a cold or temperate climate.*—This subject should be viewed in relation, first, to the change as it affects the dark races of man; and, secondly, as it respects those belonging to the Caucasian variety, who have either been born or acclimated in warm countries. —*A.* If change from a cold to a warm climate is productive of disease and great mortality in the white constitution, the migration of the dark races to a cold or temperate country is not less fatal to them; and whilst the change produces, in the former case, fevers, diseases of the biliary organs, and of the alimentary canal, it occasions, in the latter, tubercular phthisis, and other tubercular affections, with diseases of the bronchi, &c. When the dark races, particularly the negro, and those of the Mongol variety who are natives of intertropical and low countries, migrate to places subjected to a low range of temperature during a great part of the year, the depressing influence of cold upon the nervous system and vital actions of the lungs and skin, gives rise not only to tubercular formations, but also to increased secretion from the internal mucous surfaces, and they are, in the great majority of cases, cut off, in a few months or years, by diseases of the lungs, kidneys, and bowels. Those, however, who change the climate progressively, or who are born in countries of an intermediate temperature, and who are provided with warm clothing and animal or nutritious diet, suffer much less than those who migrate in a more direct manner, even although possessed of these latter advantages. The native African who removes immediately to Europe seldom lives over two winters in it; whilst the negro who has been brought to the West Indies, and subsequently to the southern states of North America, previously to his arrival in more northern countries, and enjoys necessary food and clothing, will often not suffer materially from the change.

39. *B.* Those who have been born of European parents, or been seasoned in warm climates, not infrequently suffer after removal to temperate or cold countries. Even, although the change may have become necessary from chronic affections of the liver or bowels, yet may it for a while aggravate or render more acute hepatic disorder, or superadd to it disease of the lungs; and many



who have experienced only functional disorders of the stomach or liver, or who acquired merely a tendency to them during their residence within the tropics, have been attacked by active disease soon after their return to Europe. Others, also, who have suffered more seriously, have had their complaints aggravated after a short residence in England, although they were benefited during their voyage home. This result of change to a colder climate proceeds not, however, altogether from the temperature or the state of the seasons, but in a great measure from the imprudence of the patient. Frequently, however, a colder atmosphere is prejudicial for a time, by constricting the vessels on the external surface, and determining an increased flow of blood to the large internal viscera, and thereby occasioning congestion and obstruction of those organs which have been weakened by previous disease or the influence of climate. Another frequent consequence of change from a warm to a cold country is a diminution of all the secretions, particularly those of the skin and liver; originating vascular plethora and visceral engorgement. In this state of the vascular system, if the cutaneous or pulmonary surface be subjected to cold, particularly cold combined with moisture, after the circulation has been determined to these parts by hot rooms and crowded assemblies, or if reaction rapidly follow the impression of cold, the great mass of blood is thrown upon the internal viscera, which, if not relieved by a free secretion, become the seat either of congestion or of inflammation. Hence it is that hepatitis, or dysentery, so frequently follows changes from a high to a low temperature. The remarkable liability to diseases of the respiratory organs, observed in those who have returned to Europe after a long residence in warm countries, is evidently owing, in many instances, to pre-existing disorder of the liver, which has extended thence to the lungs, owing either to the increased action of this latter organ upon removal to a colder climate, or to imprudent exposures to cold, or to breathing a very warm and close air immediately upon coming out of a cold and dry atmosphere.

40. In order to counteract these effects of change, warm clothing, particularly of the lower extremities, with the use of flannel next the skin, should be adopted; and exposures to cold and moisture, and the night air be avoided. The diet ought to be light, and of moderate quantity; the strong wines imported into this country abstained from; and, above all, the functions of the bowels and abdominal viscera carefully watched, and promoted whenever they seem to flag. It may be of importance to know the most suitable period of the year to arrive in this country, after the frame has become assimilated, by a long residence, to a warm climate. If an invalid return in winter, the sudden transition from a warm to a cold country may be detrimental; if early in the spring, he is liable to feel the effects of a variable season for some time. The least objectionable period extends from May to September; and if the cold of the winter months be found too severe in the more easterly counties, or in the metropolis, the climate of Devonshire or of Bath may be tried with as great advantage as that of most of the southern parts of continental Europe. Old residents in a

warm climate will experience much advantage from residing some time in the more southerly parts of Europe, before passing to England or other countries of the north, more particularly if they use a course of the warm mineral waters of Vichi, Carlsbad, or Ems, in their way.

41. The children born of white parents resident in the more unhealthy countries within the tropics, very generally die at an early age if they be not removed to a colder climate. They commonly sink from the *choleric form of fever* described in a separate article as incidental to infants; or from diarrhoea, dysentery, or diseases of the abdominal secreting viscera, often assuming a remittent form. When, therefore, either of these appears in this class of patients, removal to a temperate climate should be advised when it can be effected; taking care to guard them, by warm clothing, &c., from vicissitudes of temperature for a considerable time after the change, and attending to the first indication of pulmonary or tubercular disease, or disorder of the liver and bowels.

42. III. OF THE PARTICULAR LOCALITIES WHICH ARE BENEFICIAL IN DISEASE, OR OF CLIMATE AS A THERAPEUTICAL AGENT. — In this part of the subject I shall consider, *first*, the different parts of Great Britain which may be suitable places of residence for invalids; *secondly*, those in the south of Europe and the Mediterranean; and, *thirdly*, those in the Atlantic and West Indies.

43. i. *Climate of certain places in England.* — The chief difficulty in this country is to find a mild and sheltered climate for invalids from pulmonary disease; and it is almost exclusively to the south and south-west parts of the island, in the immediate vicinity of the sea, that we must direct our enquiries. The general use of coal fires in all the large towns in Great Britain, owing to the quantity of sulphur this mineral contains, and of sulphuric acid fumes and fuliginous matter generated, renders the air more irritating to the lungs, and increases the risk of a winter residence in these places, to all those who suffer from, or are even liable to, diseases of the respiratory organs. This, together with other considerations — especially the results of observation — renders it imperative on the medical attendant to recommend removal to a more salubrious locality. The mild situations I shall notice are in the south, the south-west, and the west of the island.

44. A. The *south coast* is much milder and more moist than the east and inland parts of the island, during the months of November, December, January, February, and March; but from April till October the temperature of the latter is greater. On this part of the coast, *Undercliff*, in the Isle of Wight, *Hastings*, and *Brighton*, have been recommended as winter residences for invalids. *a. Undercliff* is the most sheltered and mild of these places in winter, and its air softer and more humid in summer than either. *b. Hastings* is sheltered, during the winter and spring months, from the north and north-east winds; and, of the various places on this part of the coast, ranks next to Undercliff as a residence for invalids with pulmonary affections. *c. Brighton* is more exposed than the foregoing to the north and north-east winds, and its air is drier, and hence more bracing. It is therefore



more suitable than they to the nervous, the simply debilitated and relaxed, to the dyspeptic, to those affected with chronic bronchitis and asthma attended by greatly increased secretion. Dr. CLARK very properly suggests that invalids who select the south coast as their winter residence, should pass the autumn at Brighton, and the winter at Hastings; the climate of the former being mild to the end of December.

45. *B.* The south-west coast of the island is very mild in several situations during the winter, and has, therefore, been very generally recommended in diseases of the respiratory organs. Dr. CLARK estimates the temperature of its more sheltered localities as being  $5^{\circ}$  higher than that of London, during the winter months; and the temperature of the south coast as only  $2^{\circ}$  higher. But I conceive that there are, at least,  $6^{\circ}$  and  $3^{\circ}$ , respectively, of difference between these and London and its vicinity. Besides, it is not only the range of temperature that should be considered, but its greater equality, and less rapid vicissitudes, and the increased humidity, and more soothing influence of the air.—*a.* The places on the coast of Devonshire most in repute as residences for the consumptive, are *Torquay*, *Dawlish*, *Sidmouth*, *Exmouth*, and *Salcombe*. Of these, *Torquay* is the best; and, according to the reports of Dr. CLARK, Dr. FOOTE, and of my friend Dr. W. HUTCHINSON, who has resided in it, superior to all other places in our island in pulmonary cases.

46. *b.* *Penzance* is the principal place in Cornwall recommended for invalids. Its peninsular situation, and south-west position, give it a remarkably soft, humid, and mild atmosphere; and the equality of its temperature, not only throughout the year, but also during the day and night, renders its climate in many respects superior to that of most places in the south of Europe, and brings it next to *Madeira*. The quantity of rain that falls annually at *Penzance* is nearly double that which falls in London; the number of rainy days is much greater; and the temperature of the air at night at least  $7^{\circ}$  higher during the winter months. This mildness, equality, and humidity of climate, is, however, somewhat impaired by its exposed situation, and its liability to high winds.

47. Both the Land's End and the coast of Devonshire, owing to the predominating character of softness, humidity, and equality of climate, exert, along with a soothing, an evidently relaxing effect. Hence this coast is best suited to the irritable and inflammatory states of disorders of the respiratory organs, and such as are characterised by irritation, but little expectoration, and dryness of skin. In cases attended with a copious expectoration, great relaxation of the mucous surfaces and soft solids, and in nervous debilitated persons, this climate will prove injurious. Even in those cases where it is evidently indicated, and actually proves of service, removal will be necessary to a somewhat drier air during the summer; and this should not be deferred longer than June, or undertaken before April or May; the patient generally deriving much benefit by returning the succeeding winter. The observations now made upon the climate of the south-west coast apply to that of *Jersey* and *Guernsey*, to which islands invalids sometimes

repair, and occasionally with advantage. South-west winds generally prevail in them during autumn and winter, and cold north-east winds often continue long in the spring. The summer climate of these isles is excellent. Of the two, that of *Jersey* is preferable.

48. *C.* The *West of England*.—The mean temperature of this part of the island is a little lower than the southern coast, but in March and April it rises somewhat above it. Bath and Bristol are about  $3^{\circ}$  warmer than London during the months of November and December; but this difference is reduced more than one half during January, February, and March. In this part of the country, the vale of Bristol is the most sheltered and mildest. The climate during the winter is rendered more mild by the vicinity of the ocean, whilst the groups of surrounding mountains attract the clouds and diminish the fall of rain below the current to which its western position would otherwise subject it. Bristol Hot-wells, and the lower parts of Clifton, are the most sheltered spots, and the best suited to consumptive patients; whilst other invalids will find most advantage in the more elevated situations which the latter presents. In general, the climate of this place is perhaps the mildest and driest in the west of England; and, therefore, one of the best winter residences for invalids. It is drier and more bracing than that of the south-west coast, and therefore not so well suited to consumptive cases, and to those affected by irritative action in the respiratory passages and bronchi. For these, the more soft and humid air of *Torquay* and *Penzance* is preferable; but, with the return of summer, the consumptive invalid will relinquish the latter for the former with benefit. Clifton and Bath are certainly preferable places of residence to the south-west coast, in cases of protracted dyspepsia, gout, and scrofula, particularly the last occurring in young persons, and relaxed habits. In these affections, the waters of *Bristol Hot-well* will, with regular exercise on horseback or on foot, prove extremely beneficial.

49. The more inland districts of this part of England furnish various places which are salutary to invalids during the summer. *Malvern*, and the surrounding country, with the *Malvern* waters, are very serviceable in scrofulous and dyspeptic cases; and, for the consumptive and other invalids, various places in Wales, as *Abergavenny*, *Aberystwith*, *Tenby*, *Barmouth*, &c. will be visited during the season with advantage. Where a course of goat's whey may be considered of advantage, a summer residence in Wales will be preferred. There are various other places which, besides their mineral waters, furnish excellent summer residences for the invalid. *Buxton*, *Matlock*, *Leamington*, *Cheltenham*, *Tunbridge Wells*, &c., independently of the use of their respective mineral waters, prove excellent places of residence for those who are debilitated or exhausted, whose mucous surfaces are relaxed, or whose digestive, secreting, and assimilating functions are imperfectly performed, and any of the abdominal viscera congested or obstructed. In these latter circumstances of disease, especially, the appropriate use of the waters of those places, assisted by regular horseback or walking exercise, by suitable medical treatment, and by mental relaxation and amusement, will often prove of



great service. In prescribing the mineral waters of any of those places, due reference should be had to the nature of the climate; and, on the other hand, when directing change of climate, some attention should be paid to the waters which the place may afford; as the appropriate use of the one, whilst the patient is experiencing the influence of the other, will materially promote the end in view.

50. In a very great proportion of cases, where the state of the patient admits of change of locality, much advantage will accrue from passing the autumn on the south coast of the island, as at Brighton, Hastings, or Undercliff, after having passed the summer at the foregoing watering places. In general, when the digestive and generative organs are disordered, frequent change of air, and travelling by easy and short journeys, with gentle exercise, particularly on horseback, agreeable amusement, and regular habits, will prove of marked advantage, and greatly aid medical treatment.

51. ii. *Of the Climate of certain parts in France.*—*A.* The West and South-west of France furnishes several places, the climate of which possesses the softness and humidity which are requisite in pulmonary diseases. The mean annual temperature of the south-west of France is stated by Dr. J. CLARK to be  $4^{\circ}$  higher than that of the south-west of England; and the climate of both generally agree or disagree with the same diseases.—*a.* That of the south coast of Britany is mild during the winter, and temperate in summer, the mean temperature of this province being about  $56\frac{1}{2}^{\circ}$ . Its climate is soft and relaxing; and it is hence suited to dry bronchial irritations, to hæmoptysis, and tubercular cases. LAENNEC found it very favourable to consumptive patients, and states that the proportion of such in this part of France is very small. In scaly eruptions on the skin, dysmenorrhœa, and in irritable habits of body, this climate will be often of service.

52. *b.* Pau, situated at the base of the Pyrenees, from the account of it given by Dr. CLARK and Dr. PLAYFAIR, appears to be the best place in the south-west of France for invalids; and yet, in no respects is it superior to the south-west of England in consumptive cases. Its air is still and mild in winter and spring; the chief advantage it offers being the great mildness of its spring. Dr. CLARK gives the following comparison:—Its mean annual temperature is  $4\frac{1}{2}^{\circ}$  higher than that of London, and about  $3^{\circ}$  higher than that of Penzance; it is about  $5^{\circ}$  lower than that of Marseilles, Nice, and Rome; and  $10^{\circ}$  lower than that of Madeira. In winter, it is  $2^{\circ}$  warmer than London,  $3^{\circ}$  colder than Penzance,  $6^{\circ}$  colder than Nice and Rome, and  $18^{\circ}$  colder than Madeira. But in the spring, Pau is  $6^{\circ}$  warmer than London, and  $5^{\circ}$  warmer than Penzance; only  $2\frac{1}{2}^{\circ}$  colder than Marseilles and Rome, and  $7^{\circ}$  colder than Madeira. The range of temperature between the warmest and coldest months at Pau, is  $32^{\circ}$ ; this at London, and likewise at Rome, is  $26^{\circ}$ ; at Penzance it is only  $18^{\circ}$ , and at Madeira  $14^{\circ}$ . The daily range of temperature at Pau is  $7\frac{1}{2}^{\circ}$ ; at Penzance it is  $6\frac{1}{2}^{\circ}$ ; at Nice,  $8\frac{1}{2}^{\circ}$ , and at Rome,  $11^{\circ}$ . Pau is drier and warmer than the south part of England in the spring, and northerly winds are less injurious. One of its

chief advantages is its vicinity to the watering-places among the higher Pyrenees, which are often beneficial places of summer residence to those who have passed the winter and spring at Pau.

53. *B.* The South-east of France.—The climate of the tract of country extending along the shores of the Mediterranean, from Narbonne and Montpellier to the Var, is warmer and drier, but more exciting, than that of the south-west. It is subject to sudden vicissitudes of temperature, and to cold winds, especially the north-west, or *Mistral*. It is decidedly prejudicial to consumptive patients, especially when the disease has made some progress, and to irritative affections of the stomach, trachea, or larynx; and is serviceable chiefly in diseases of debility and relaxation unattended by inflammatory or hæmorrhagic action.

54. Dr. CLARK ranks the principal places on the coast of Provence in the following order, as residences for invalids:—Hyères, Toulon, Marseilles, Montpellier, Aix, Nismes, Avignon.—*a.* Hyères possesses the mildest climate on this part of the coast, being sheltered from the north winds by a range of hills; and its inhabitants being comparatively exempt from pulmonary affections. *b.* At Marseilles the climate is dry, variable, and subject to cold irritating winds. It is therefore injurious to consumptive patients; and is one of the places in France where pulmonary diseases are most prevalent. Invalids requiring a dry air, and capable of bearing cold winds, may be benefited by residing here for some time. *c.* Montpellier has obtained a reputation for salubrity to which it has no claims. According to MM. FOURNIER and MURAT, more than a third of the deaths that occur in the hospital of this city are from pulmonary consumption. The prevalence in this part of the country of northerly winds during winter and spring, both accounts for the frequency of pulmonary diseases, and points out its unsuitability as a residence for patients thus affected. *d.* Aix is still more exposed than Montpellier to the Mistral and north winds, and pulmonary complaints are very prevalent among its inhabitants.

55. *C.* Nice, although situate on the same line of coast as Provence, enjoys a much milder climate than any part of that province. It is protected by a lofty range of mountains from the north winds; and the daily range of temperature is there less, than at almost any part of the south of Europe. During winter the weather is settled, and the atmosphere clear, the thermometer seldom sinking to the freezing point, excepting at night. At this season, however, as well as in the spring, cold dry winds are not infrequent; and the climate is, upon the whole, dry and exciting. Hence it is not favourable to pulmonary consumption,—the very disease for which it was formerly very improperly recommended. It is likewise unfavourable to irritable or inflammatory states of the larynx, trachea, and bronchi, attended with scanty expectoration, or hæmoptysis. But chronic bronchitis, bronchorrhœa, and humoral asthma, are generally very much benefited by the climate of Nice. It is also serviceable in all cases of debility, torpor, and relaxation of the mucous surfaces; in chronic rheumatism, gout, external scrofula, dyspepsia, and hypochondriasis.



56. iii. *Of the Climate of Italy and Mediterranean.*—A. Genoa is not favourably noticed by Dr. CLARK as a residence for invalids; but Dr. JOHNSON, on the authority of Dr. MOJON, speaks of it in more favourable terms. It is best suited to those affected by chronic bronchitis, and dyspeptic and gouty complaints; and to persons of relaxed and phlegmatic habits of body. Pisa, Rome, and Naples are the other places in Italy most frequented by invalids. The climate of Pisa nearly resembles that of Rome, the latter being somewhat warmer and drier in winter. Dr. CLARK considers the climate of Rome as one of the best in Italy for consumption, unattended by hæmoptysis. For those, however, who cannot take exercise in the open air, and must confine themselves to sheltered situations, the Lung' Arno in Pisa is the best place of residence to be found in Italy. The climate of Naples is considered by this writer, as well as by M. LASNYER, more exciting than that of the two foregoing places; and it is more subject to high winds. The diseases which a residence in either of these three cities will benefit, are those above enumerated. Persons who remain in Italy during the summer, will find Lucca, Sienna, and the vicinity of Naples, the coolest situations.

57. D. There are various other places on the shores and islands of the Mediterranean, the climates of which are suitable to invalids; but we possess little or no accurate information respecting them. Malaga in the south of Spain, Cagliari in Sardinia, and some parts on the coast of Sicily, afford a mild winter climate, but the difficulty of reaching them, and of obtaining in them many necessary comforts and conveniences, almost precludes invalids from the northern parts of Europe from visiting them. Malta is not open to these objections; but, according to Dr. HENNEN, the quantity of dust raised from its arid soil, and suspended in the air, during dry weather, renders it an unsuitable climate for consumptive patients. A considerable number, also, of the inhabitants die of pulmonary diseases. In his work on the medical topography of the islands of the Mediterranean, Dr. HENNEN states a fact, which is perfectly in accordance with my observation in warm climates, although doubted by Dr. CLARK, viz. that those of the *Ionian Islands*, which are decidedly most malarious and remarkable for remittents, have had fewest pulmonary affections amongst the British troops. In respect of the health of the troops stationed in these islands, this writer states, that, from an average of seven years, phthisis has borne a proportion to other complaints of 1 to 198 $\frac{1}{4}$  only. At Malta, on an average of eight years, consumption has occurred in the proportion to other maladies of 1 to 93 $\frac{1}{2}$ . Including all pulmonic complaints whatever, the proportion to others, as regards the Ionian Isles, has been 1 to 20 $\frac{3}{4}$ ; and, as respects Malta, 1 to 14. Taking into calculation the whole Mediterranean islands, the proportion of pulmonic, to other diseases, has been 1 to 17 $\frac{1}{4}$  in the British army.

58. iv. *Climate of the Northern Atlantic.*—Under this head the climates of Lisbon, Cadiz, Madeira, the Canaries, the Azores, Bermudas, and the Bahamas, may be arranged; all of which have been recommended to persons requiring a soft and equable climate, during the winter and spring.

59. A. Madeira is, of all these places, indisputably the best, as respects both the climate, and the comforts and conveniences within the reach of the invalid. The frequency and excellency, also, of the means of conveyance to and from the island are no small recommendations. From the minute account furnished of the climate of this island, by Drs. GOURLAY, HEINEKEN, and RENTON, after a long residence in it, and from the effects I have observed in several persons who had resorted to it as a winter's residence, it may be justly concluded, that it is superior to any part of the south of Europe for consumptive cases. Its central ridge of mountains gives it, in summer, a cool land wind; and the north trade winds, at this season, render it temperate and salubrious. During winter and spring, Funchal, and parts near the sea-shore, are the best places of residence; and, during summer, the more elevated situations in the interior are cool and agreeable. The mean annual temperature of Madeira is about 6° higher than the south-east of France and Italy; and the heat throughout the year is much more equably distributed. The winter of the former is 12° warmer than that of the latter, and the summer 5° cooler. At Madeira the extreme annual range is only 14°, whilst it is double this amount at Pisa, Rome, and Naples. In respect also of the progression and steadiness of its temperature, it excels those places. Rain falls at Madeira on 73 days of the year, and at Rome on 117 days, and chiefly during the autumn in the former. The air is also more soft than at Rome.

60. B. The Canaries possess the next best climate to Madeira. The mean annual temperature, however, of Santa Cruz, the capital of the former, is 71°; whilst that of Funchal, the capital of the latter, is only 65°. The summer temperature of Santa Cruz is 7° warmer than that of Funchal, and the winter temperature 5° warmer. Hence the mean annual range of temperature is greater in the Canaries than in Madeira; which possesses, in other respects, advantages sufficient to recommend it in preference to the former in pulmonary diseases.

61. C. The *Western Islands*, or Azores, enjoy a climate nearly approaching to that of Madeira. They are, however, more subject to high raw winds, particularly those from the north and north-west, which are often very cold and harsh; and the temperature of winter is lower, and that of summer higher than in Madeira. The air is also more humid. From a very short visit I made to Madeira and the Azores,—to the former in the spring, and to the latter in winter,—I should conclude the Azores to be much inferior to Madeira as a residence for invalids, chiefly because of the absence of many necessary comforts and conveniences, of their stormy winters, and the infrequency and ineligibility of the opportunities of transport between them and this country. The climate of the *Bermudas* and *Bahamas* presents no advantages sufficient to obtain for them a preference to those already noticed. They are liable to storms, and to harsh northerly winds in winter, from the American coast, whilst their summers are very hot.

62. v. *Climate of the West Indies.*—The mean annual temperature of the West Indies, at the level of the sea, is 79°, 80°, and 81°; and during the



winter months, in some places, about  $3^{\circ}$ , and in others only  $2^{\circ}$  lower. The extreme annual range is  $20^{\circ}$ , and the mean daily range about  $6^{\circ}$ . This continued high temperature exhausts the energies of invalids; and the clearness of the skies, and great power of the sun, prevent suitable exercise in the open air. A visit to the West Indies of a few months' duration, made either to some of the most healthy islands, or passed chiefly aboard ship, will, however, prove of service in several chronic affections, particularly those referred to above (§ 37.), excepting consumption in its more advanced stages. Persons much disposed to this disease, either hereditarily or by the conformation of the chest, &c., or who are threatened by its early stages, will find a removal to the West Indies one of the prophylactic measures most to be depended upon. When residing some time in an extremely malarious place within the tropics, I observed that the most healthy persons in it were those who were constitutionally disposed to pulmonary disease. But I believe, that the observation often made, is perfectly correct, that removal to an intertropical country, when phthisis is far advanced, will only accelerate its progress. It may also be stated, that severe and protracted catarrhs are very common upon entering between the tropics. In gout, chronic rheumatism, scrofula, and calculous affections, a residence in the West Indies is often productive of advantage.

63. vii. *Of residence on the sea shore and voyaging.*—There are certain topics connected with change of climate often discussed during the course of practice, viz. whether are inland situations, or places on the sea-shore, whose climates are physically alike, most serviceable in pulmonary diseases? and whether or not sea-voyages possess any advantage over a land residence in these complaints. *a.* In respect of the first question, it may be stated, that places on the sea-shore are generally more humid than those inland, and oftener, on this account, preferable in the dry and the hæmorrhagic pulmonary affections; whilst a situation somewhat inland, or not removed above a few miles from the coast, seems somewhat more serviceable in those cases of consumption which are otherwise characterised. But the question has not been satisfactorily determined, and, indeed, is not easy of solution.

64. *b.* With reference to the second question, it may be stated more confidently, that sea-voyaging, in a suitable climate, is preferable to land residence in the early stages of phthisis, and particularly when it is attended by hæmoptysis. This advantage is evidently to be attributed to the influence of the ship's motion on the sanguineous and nervous systems. This opinion was argued for by Dr. GREGORY, in his excellent thesis, *De Morbis Cæli Mutatione Medendis*, and has been generally admitted. Cruising in a warm or even temperate latitude, particularly in the Atlantic, is preferable to voyaging, because of its longer duration. Whilst the sun is north of the equator, the climate between the 30th and 50th degree of latitude; and while the sun is south of the equator, that from the 20th to the 35th or 40th degree of north latitude, will be found the most salutary. During winter, voyages between Madeira and the West Indies; and, in summer, between Madeira and this country, in the vessels constantly trading between England

and the West Indies, and which generally touch at Madeira, might be undertaken with advantage. These vessels furnish tolerable accommodations, which may be easily improved or adapted to the state of the invalid.

65. *A.* When the winter has been passed in any of the warmer situations noticed above, attention ought to be paid to the time of returning to this country. This should not be earlier than the first, or later than the last week in June. If the invalid have passed the winter in the south of France or in Italy, these places may be left early in May, and he may travel cautiously through Switzerland, avoiding exposure to the evening and morning air. During the journey, warm clothing should be resorted to as soon as the temperature falls so low as to become sensibly cold; and a free circulation in the skin and extremities ought to be carefully preserved.

66. *B.* With respect to the diseases which are benefited by change of climate, it is unnecessary to add any thing at this place, as the climates which seem most serviceable are noticed when discussing the treatment of those diseases in which most advantage is derived from removal to particular climates. The affections for which this treatment may be employed, are *scrofula, tubercular disease of the lungs, hæmorrhage from the lungs, &c., chronic bronchitis, asthma, chronic rheumatism, dyspeptic and hypochondriacal affections, urinary calculi, and various cachectic and hydropic affections.* (See the treatment of these complaints in their respective articles.)

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### COLD.—(CLASSIF. PATHOLOGY. *Ætiology and Therapeutics.*)

1. Cold is merely a relative term, expressing a sensation produced by the abstraction of heat by any substance of a lower temperature than that of the body or part which feels; consequently this sensation is not always occasioned by the same degree of temperature. Nature has recourse to various means for abstracting animal heat from the body, under circumstances requiring it; and for preventing the dissipation of it, under other circumstances; and the instincts and reason of the animal creation are often evinced in furthering these objects. The dark skin of certain varieties of our species, and the thin hairy covering of many of the lower animals inhabiting hot countries; the fair well-clothed skins, and the thick coverings of wool or fur with which those of cold climates are provided; and the construction of the dwellings, &c. in different and opposite climates; are all provisions intended to accelerate, under certain circumstances, and to delay, the dissipation of animal heat under others.

2. The functions of the living economy can be performed within a certain range of temperature only, for any considerable time. Above or below this range, they will more or less rapidly cease, according to the extent to which the change may be carried in either direction, and the rapidity with which it is effected. Whilst the abstraction of heat is produced more rapidly than it is supplied, either in a part or in the whole body, depression of the vitality takes place co-ordinately with the rapidity of the loss of temperature; but, on the other hand, when the abstraction of heat is altogether prevented by living in a medium of equal or greater temperature, excessive vascular excitement, rapidly exhausting the sensible and irritable properties of the tissues, and thereby terminating human existence, is the consequence. The heat of the human body seldom varies, in health, above 100° or below 96° of Fahrenheit's thermometer; and although man may live in a lower temperature than the zero of this scale, when suitably fed and clothed, owing to the activity of the respiratory and heating functions, yet, in consequence of the nature of these functions, he cannot exist for any considerable time in a mean range of temperature above that of his own body. In no part of the globe is the mean annual range of atmospheric heat within twelve degrees so great as that of the living frame.

3. i. **PHYSIOLOGICAL AND PATHOLOGICAL EFFECTS OF COLD.** — *A. A general view of its effects.* In considering, therefore, the effects of cold upon the body, due reference should be had to the state of the respiratory and heat-

ing functions, which are essentially vital, and active in proportion to the greatness of the constitutional powers. The abstraction of caloric, or cold, when carried far, first depresses, and afterwards annihilates, the vital actions of a part, by depriving it of that principle which is necessary to preserve the various tissues composing it in a suitable state for reciprocity of action, and which observation shows to be necessary to the healthy performance of the sensiferous and circulating functions especially. When heat is abstracted to a greater extent than it is supplied, sensibility is diminished or numbed; and circulation, as respects both rapidity and size of the current in the vessels, is lessened. This effect may be produced in a part or extremity to the extent of annihilating these functions in it, whilst in the internal viscera they either remain entire, or are but little changed. When this is the case, the part affected will permanently lose its vitality, if these functions be not soon restored by frictions, and a very gradual admission of heat. A part thus affected by cold is said to be frost-bit,—an accident to which the more exposed parts of the body are liable in very depressed states of temperature. Even friction only may occasion too quick a change of temperature, if it be not made with some substance, as snow, which may prevent the too sudden increase of heat, and the risk of immoderate reaction. When the vital energies are weak, a less degree of cold will depress them than when they are energetic; and, upon its removal, vascular reaction will be less apparent, or even not at all supervene. If cold be not great, or too long applied, relatively to the vital energies, increased action, as evinced by a glowing sensation, follows its impression. When, on the other hand, it is excessive, either in degree or continuance, the depression of vital power, especially the manifestations of this power in the nervous and circulating organs, is co-ordinate, the living animal sinking into a state of torpidity from which it is with great difficulty roused. Thus cold, momentarily or briefly applied, when the constitutional powers are not very much impaired, proves, if not excessive, an excellent invigorating or tonic agent, owing to the re-action which follows; but when acting energetically, or for too long a time relatively to the state of those powers, it will produce one of two effects, according to the circumstances attending it, or following its application: either it will depress the vital actions beyond the power of recovery, the system sinking into a comatose state, or struggling between this state and partial or irregular reaction; or it will be followed by increased or even uncontrollable vascular action, soon exhausting the vital manifestations of the vessels and the irritability of the frame, or of the part principally exposed, and occasioning dissolution of the blood. While the continued action of that degree of cold, which may be endured for a short time, very often produces the former result; the momentary exposure to excessive cold, or the injudicious application of heat in an inappropriate or too rapid a manner, after the more moderate but prolonged action of this agent, is usually followed by the latter. Inflammations are not infrequently induced in this manner in the organs to which cold has been directly applied, as in the case of inflammation of the lungs coming on after passing into a warm apartment



immediately from a cold atmosphere. In other cases, the impression of cold when prolonged, although moderate, may, by diminishing vital action in the parts on which it acts, so determine and increase it in distant or even opposite parts or surfaces, as to give rise to inordinate secretion or vascular action in the latter. Such being the more general effects of cold upon the system, it will be advantageous to examine its mode of operation more closely, in order that we may be enabled to form accurate ideas as to its influence in the causation and removal of disease.

4. *B. Particular effects of cold.*—*a.* The primary effects of the abstraction of heat from a part, to the extent of producing a decided sensation of cold, appear to be exerted upon the nervous system, whose sensibility and vital manifestations it lowers, and, when excessive, entirely annihilates. These effects are obvious in both the organic and voluntary classes of nerves; and are at first attended by an alteration of their sensibility of a slightly painful kind, often followed by loss of their functions. Thus, cold will occasionally give rise to local paralysis. When an intensely cold substance is applied to a living tissue, the rapid abstraction and passage of its caloric through the living surface intervening between them, cause similar effects to those following the rapid communication of caloric by a heated body, and thereby momentarily excite the nerves and vital turgescence of the intervening parts. Thus, intense cold will produce vesication, inflammation, &c. of the skin.

5. *b.* The action of cold, when slowly or moderately applied, in diminishing *vital turgescence*, the bulk of the tissues, and the activity of the circulation, seems coeval with the effects produced by it on the nerves. By this action the small arteries, veins, and secreting pores are constricted, and the communicating canals between the extreme arteries and radicles of the veins are rendered smaller and less pervious. Hence, when cold is applied to the surfaces of the body, the circulation there and in the vicinity is diminished, and the blood is driven thence, and accumulates in the large veins of the internal viscera. Owing partly to this operation, and partly to the sedative effects of cold upon the nervous system, the whole circulation becomes weakened, and congestion of the large vessels and internal erectile tissues takes place. If the impression of cold is only for a short period, the vital energy not being at the time materially deficient, the heart and large vessels are enabled to react upon the load that oppresses them, and an increase of the circulating functions ensues. But when the impression of cold continues, circulation becomes less and less active, with at first slight or inefficient efforts at recovery, and at last ceases entirely.

6. *c.* Muscular parts are very sensibly affected by cold, in consequence of its effects upon the nerves supplying them, and of the diminution of the circulation in them. Nervous energy, therefore, being depressed, and the circulation weak and insufficient, muscular contractions also become weak and tremulous; and the muscles subsequently stiff, or altogether rigid, frequently with cramps or spasms intervening between these states. A share of these extreme effects is, doubtless, owing to the vascular congestion produced on the cerebro-spinal axis, and on the origin of the nerves supplying the muscles. The

cramps often occurring after plunging into cold water, or while swimming, are illustrations of the effect on the muscular system of moderate cold suddenly applied to the surface, and of its action thereon, through the medium of the nervous and vascular systems. After the power to make muscular exertion ceases, in consequence of the continuance or increase of cold, remarkable stiffness and rigidity of the voluntary muscles supervene, sometimes extending to the respiratory muscles, and producing asphyxy. In many cases, where cold acts intensely or suddenly upon the surface of the body, rigidity takes place with remarkable celerity, as stated by QUINTUS CURTIUS, and MM. PARAT, MARTIN, and BEAUPRÉ, to have occurred in the expedition of ALEXANDER, and the retreat of NAPOLEON from Moscow. Trismus and tetanus have followed, in some cases, a moderate decrease of temperature, and difficult articulation is not an uncommon effect of this cause.

7. *d.* The influence of cold upon the respiratory and calorific functions is very manifest. When atmospheric cold is moderate, and sufficient exercise is taken in it, and the cutaneous surface and extremities are sufficiently clothed, then respiration is energetic, the changes produced on the blood are complete, and animal heat is freely generated, and is sufficient to supply the continued loss of it from the surface of the lungs. But when cold depresses the nervous power, owing either to its excess, or to the circumstance of its acting simultaneously upon both the cutaneous and pulmonary surfaces, or to the circulation being unaided by muscular exertion, then respiration becomes laborious, quick, and painful; and the production of animal heat is insufficient to preserve the fluids and soft solids in a suitable state for reciprocal action, rigidity, followed by congelation, first of the extremities, and subsequently of more central parts, taking place. As long as the nervous energy and the circulation are unimpaired, animal heat is freely developed; but it becomes co-ordinately depressed with the failure of these, and returns in a proportionate degree with their restoration. When cold has acted for a considerable time upon the frame, animal heat is either restored with difficulty, or it continues to vacillate and sink with the nervous and circulating functions until death supervenes. It is chiefly during the period which elapses between the exposure to cold, and restoration from its effects, that diseased action commences, or is developed. Too long continuance in a cold bath, wet clothes, and numerous other means of refrigerating the body, will produce a loss of temperature that may never be recovered. Dr. CURRIE found that a man with a temperature of 98°, three hours after cold bathing and exposure to a north wind, had not recovered his natural heat, although warm stimuli, frictions, &c. had been employed. During such states of protracted restoration, various morbid states are apt to originate and to give rise to a train of diseased actions, varying in almost every case with the constitution, temperament, predisposition, and habit of body of the individual. Even after reaction has taken place, some particular organ or part may suffer especially owing to these predisposing circumstances; and inflammation, with effusion, disorganisation, &c. may be the result.



8. *e.* The effects of cold upon the *brain and the organs of sense and voluntary motion*, are similar to those already described. Hearing, sight, touch, &c. become imperfect, the functions of mind impaired, and insensibility, somnolency, delirium, and convulsions supervene. The somnolency, and indifference to the consequences of indulging it, when long exposed to cold, have been well known since the accounts given of the cases of Dr. SOLANDER and Sir J. BANKS, in Terra del Fuego, of MAUPERTUIS in Tornea, and of CAPTAIN PARRY's associates in the north-west expedition. But the fullest description of its effects upon the senses and cerebro-spinal centres is given by BEAUPRÉ. The same degree of cold, according to the state of the system and the extent to which the surface is protected, will cause either delirium of a quiet comatose kind, or raving madness, or convulsions, passing into tetanic rigidity. Great insensibility and somnolency will also often steal upon their victim, without any other mental disturbance; and occasionally they will be preceded by tremors, delirium, and convulsions.

9. *f.* Cold produces very decided effects upon *secreting organs and surfaces*. When it acts directly upon either of these structures, it diminishes or entirely suspends their functions, owing both to its sedative action on the nerves and circulation, and to its constricting influence upon the canals and pores of the part, it thereby lessening vascular turgescence and vital manifestation. Cold air or cold fluids acting upon the external surface interrupt the functions of the skin, particularly if the cold be combined with moisture. A similar effect is produced upon the pulmonary mucous surface, only if the cold be intense, and if it be at the same time humid. As long as the cutaneous surface is protected, and the vital energy of the frame is unsubdued, the exhalation of vapour from the lungs, and the other changes in the blood that take place in this organ, are not materially interrupted until the temperature of the air falls much lower than can be endured by the external surface. When, however, the air is very humid as well as cold, the aqueous exhalation from this organ also is much lessened. The remarkable tolerance of cold by the lungs during exercise and a protected state of the external surface, is evidently owing, 1st, to the circumstance of the quantity of air received at each inspiration being a part only of the whole air contained by them; and, 2d, to the changes in the capacity of the circulating and respired fluids for caloric, by which the respiratory actions are attended. Whilst the nervous and circulating functions are unimpaired by cold, diminution of the cutaneous and pulmonary exhalations is compensated for, and injurious plethora of the vascular system prevented, by a proportionate increase of the secretions from the kidneys and intestinal mucous surface. Owing to this activity of the internal secretions, and centralisation of vital energy, the appetite is also increased—sometimes rendered even ravenous—digestion is accelerated, and the stomach enabled to dispose of substances which would otherwise be rejected from it. When cold acts upon the frame for some time, and is great relatively to the condition of the digestive organs or vital power, a nearly paralytic state of the nerves of the alimentary canal may ensue, giving rise to

interrupted secretion, to flatulent dilation of large portions of it, either with or without spastic constriction of other parts, and to painful and anxious suppression of all its functions.

10. *C.* *Of the effects of cold in various states of the system.*—*a.* It has already been stated that the injurious effects of cold are great in proportion to the depression of vital power at the time of its action. When the surface of the body is warm, or even overheated, but not perspiring, when vascular action is energetic, or the nervous power excited, cold is well and safely borne; but when the body is perspiring freely, and at the same time exhausted, or the depressing mental passions are in operation, it produces a much more intense and rapid effect, not only by obstructing the cutaneous perspiration, but also by occasioning either interruption of the internal secretions, followed by febrile action, or a morbidly increased flow of some one or more of these secretions, according to the state of the body at the time. The experiments, however, of FORDYCE, BLAGDEN, and DOBSON, and the practice of the Russians, show that the free perspiration produced by heated air and the vapour bath, as long as the excitement of the nervous and vascular systems occasioned by these continues, may be checked with impunity, and even give rise to a salutary reaction.

11. *b.* Exposure to cold and wet, in cases of shipwreck, &c., particularly in winter, is productive of bad effects, great in proportion to the rapidity with which evaporation of the moisture from the surface of the body takes place. As the temperature of the sea, in winter, is always higher than that of the air, and is not lowered, as that of the air is, by evaporation from the wet clothes of the person thus exposed, so has it been observed on numerous occasions, and particularly in the instance recorded by Dr. CURRIE, that persons who have remained almost wholly immersed in sea-water have always lived longer than those who were exposed to the refrigerating action either of the wind only, or of the wind assisted by evaporation from the wet surface and clothes. Protracted immersion, also, is not so injurious in salt as in fresh water. This is chiefly owing to the higher temperature of the former than of the latter, and partly, perhaps, to the stimulating effects of the salts dissolved in sea-water on the skin. In cases of shipwreck it is not unusual to find, that those who had taken spirituous liquors to excess during the period of their peril are the first to fall victims to the effects of cold. This, most probably, is owing to the exhaustion consequent upon the excitement produced by spirits; to the fluxion and centralisation of vital power in the parts on which the stimulus directly acts; and chiefly to the circumstance that such excesses cooperate with cold in producing congestion of the vessels within the cranium, and apoplectic lethargy.

12. *c.* During states of morbidly excited vascular action, unattended by free excretion, or a perspiratory state of the skin, the external or internal application of cold is beneficial, by lowering the nervous and vascular excitement to that state which is requisite to a due performance of the secreting and excreting functions. But in order that this effect should be obtained, it will generally be necessary to continue the application of



cold for some time, or frequently to repeat it after short intervals, as reaction usually follows a brief use of it; but as soon as the disposition of the morbidly increased action to recur no longer is evinced, a prolonged application of cold may be injurious by depressing the vital energy so low, that recovery either of the part on which it directly acted, or of the system generally, may be a matter of difficulty. In many of such cases, rigors will follow the too protracted or intense operation of this agent, and be the means of bringing about reaction, which, however, may assume irregular or excessive states, or produce a new or modified train of symptoms.

13. *d.* During the exhaustion following muscular exertion in hot weather, and while the surface is freely perspiring, cold in any way is most intensely and rapidly injurious, particularly when it is applied to the stomach. The ingestion of a large quantity of a cold fluid in this state has been speedily followed by death. This extreme effect has not been satisfactorily explained. That inflammation may be so quickly induced cannot be admitted. It seems more probable that the sudden impression of the cold fluid upon the nerves of the stomach, together with the rapid distension of the organ, paralyses the system of nerves which supplies the digestive organs, and which is evidently that part of animal organisation on which the vital manifestations throughout the frame more immediately depend. Even when cold, owing either to the less bulk of the cooling body, or to the state of the stomach and system at the time, is not quickly or intensely injurious, still it may be productive of injury by favouring the development of inflammatory action in the stomach or liver, or by interrupting the secreting actions of these and adjoining viscera.

14. *D. Changes observed in cases of death by cold.* — QUELMALZ found the vessels of the brain turgid with blood, and the large veins and arteries filled by polypous concretions; and he refers the sopor preceding death to congestion of blood in the cerebral vessels, and effusion of serum in the ventricles of the brain. ROSEN also observed the vessels within the cranium engorged with blood. CAPPEL states that he found the blood and fluids accumulated chiefly in the pectoral and abdominal viscera. Dr. KELLIE detected, in two cases examined by him, the same appearances as were remarked by QUELMALZ, ROSEN, and CAPPEL; and noticed, in addition, a bloodless state of the scalp, engorgement of the sinuses, integrity of the substance of the brain, remarkable redness of the small intestines from turgescence of the blood-vessels, and absence of tympanitic distension.

15. *E. Of cold, or undue abstraction of animal heat, as a cause of disease.* — Cold is either a pre-disposing or an exciting cause of a very great number of diseases, particularly among the poor, and during the winter and spring seasons, as J. P. FRANK and Sir G. BLANE have demonstrated. The injurious effects of this agent on infants and children are great in proportion to the earliness of the age at which they are exposed to it. I believe that more than one half of the deaths, and two thirds of the diseases, that occur among the children of the poor, are more or less caused by it. Cold will produce modified

and even opposite effects, according to its intensity and duration. It has already been shown, that, during the integrity of vital power, a brief or moderate impression of cold is an indirect stimulant, and an excellent tonic remedy; whilst a very intense or prolonged action of this agent is a direct depriment of the vital energies, even although the rapid abstraction of much cold may inflame and disorganise the parts through which it is caused to pass. Hence it must be obvious that cold will be either a pre-disposing or an exciting cause of disease, according to the intensity, duration, and manner of its operation, to the constitution of the person on which it acts, and to the other causes and influences which cooperate with it. The same circumstances will also explain the great diversity of its effects, and its operation in determining the characters and complications of numerous maladies, even after their career has commenced.

16. After what has been advanced respecting the physiological and pathological action of cold, I need not add any further observations on the manner in which it operates in the causation of particular diseases. It will be sufficient to enumerate those which it most frequently produces, either by its unaided operation, or in conjunction with a pre-existing disposition or disorder, and with other morbid influences. Fevers, inflammations of the individual viscera, dropsies of the shut cavities and anasarca; catarrhal and bronchitic affections, hæmorrhages; diarrhœa, dysentery, and diabetes; rheumatism and gout; apoplexy and paralysis; tetanus, and other spasmodic and convulsive maladies; the obstruction of secreting and excreting functions — of the bile, of the urine, of the catamenia, and of the intestinal excretions; scrofulous, scorbutic, and chlorotic complaints, hardening of the cellular tissue and œdema, chilblains, and congestions and obstructions of glandular and secreting parts, are among the most common consequences of this agent. Fevers occasioned by cold alone are generally ephemeral, or of short duration, when no particular organ or function is already in fault; and the reaction — generally ushered in by rigors — is of a salutary tendency when kept within due bounds: but cold favours directly and indirectly the spread of typhoid infection; and its action on the frame during the progress of all continued and exanthematous fevers is very often injurious, unless judiciously regulated and employed, and is productive of many of the dangerous complications which frequently arise in their course, as well as of the local affections that appear during or after convalescence from them. Such is more remarkably the case in respect of the exanthematous fevers. Dropsical and hæmorrhagic effusions, although obviously depending, in many cases, on pre-existing organic change, yet often, even in these instances, have been determined by this agent. The greater prevalence also of dropsies, particularly after the exanthemata, in cold than in warm climates; and the paucity of pulmonary, hæmorrhagic, and diabetic complaints in hot countries, ought not to be overlooked. The frequency of dysenteric, tetanic, and spasmodic affections in warm climates is no argument against their production by cold, inasmuch as they there arise chiefly from a relatively great depression of temperature. The



influence of cold in occasioning apoplexy and paralysis, particularly in aged persons, has been long admitted and satisfactorily proved by WEPFER, ZACUTUS, CULLEN, FOTHERGILL, MARCARD, PENADA, WALTHER, THILENIUS, WEBER, and others; and scrofula is almost entirely a disease of cold and moist countries.

17. *F. Circumstances often favouring or determining the injurious action of cold.*—*a. Weakness of constitution* favours the injurious action of cold upon the frame. Infants, convalescents from disease, and aged persons, are more injuriously affected by cold than those in whom the nervous, circulating, and respiratory functions are fully developed and unexhausted, and who are thereby enabled to generate vital heat to supply the loss of it going forward on all the exposed surfaces. *b. Exhaustion by excesses* is one of the most common predisposing states to the injurious operation of cold. The violent or fatal effects of a cold bath at a moment of exhaustion by muscular labour have been well known, at least since the time of ALEXANDER the Great, who nearly perished from this imprudence. The exhaustion consequent upon venereal excesses renders the system remarkably sensible of depressions of temperature, as well as disposes it, in an uncommon degree, to the ill effects usually resulting therefrom. The same remark applies to the depression consequent upon the excitement of spirituous liquors. The habitual indulgence in warm apartments, and sleeping in close chambers, with too great a quantity of clothes on the bed, are very injurious, especially to females. *c. The internal determination of the fluids* accompanying certain diseases, as chronic bronchitis and diarrhoea, chronic inflammations of the viscera, cachectic affections, &c., and even that attendant upon a full meal, or the occasional or repeated indulgence in exciting beverages, or the operation of cathartic medicines, favour the injurious operation of cold upon the frame, particularly in delicate constitutions.

18. ii. TREATMENT OF THE ILL EFFECTS OF COLD.—*A. Means of prevention and counteraction.* *a.* Vascular and mental excitement, and physical and moral courage, are among the most powerful aids to the *resistance of cold*. To these should be added, when within reach, warm woollen or fur clothing; exercise; warm diluents, as tea, coffee, chocolate; gently stimulating cordials and tonics, and warm nutritious diet. All vinous and spirituous excitants are injurious when used against intense or prolonged cold, as they occasion internal fluxion and exhaustion. If resorted to at all, they should only be taken in small proportions, and in large quantities of hot diluents. This opinion is founded on repeated observation, and agrees with that advanced by Dr. CLENDINNING, who has paid much attention to this subject. According to the experience and practice of northern nations, and of those in warm countries who use either no clothing, or but little, the anointing of the cutaneous surface with oleaginous substances tends greatly to retard the refrigeration of the body.

19. *b.* When cold has produced incipient ill effects in the frame, indicated by horripilation, trembling, rigors, &c., a warm bed; hot diluents; stimulating diaphoretics, especially large doses of the spiritus æther. nitricus (from 3j. to 3iij. for a

dose), either alone, or with the nitrate of potash and camphor; the repeated exhibition of ammonia, camphor, and opium—the last in small quantities; the warm or vapour bath, followed by friction of the surface; warm spices and cordials, are among the most certain means of restoration. It should be kept in recollection, that the sooner we succeed in counteracting the directly sedative effects of cold, the less violent will be the consequent reaction, and the less injury will ultimately result to the economy. As soon as reaction begins to appear, the treatment should be modified; and the means used to determine to the skin should be of a less stimulating kind; as the preparations of antimony and ipecacuanha; nitre, with camphor, and either of these substances; Dover's or James's powders, &c. &c. Whenever cold has caused shiverings or rigors, with pains in the head, back, and limbs, free reaction not having yet supervened, we may be satisfied that this state of system is associated with interrupted secretion and excretion; and that a quick restoration of these functions should be attempted. Therefore, if there be no symptom to forbid it, an emetic, followed by warm diluents, and the warm bath, and these by a cathartic medicine, should be prescribed, in order to restore a salutary reaction, and the suppressed secreting and excreting functions. In cases presenting the *extreme effects* of either very intense or prolonged cold, the means of restoration should be very gentle at first, and very gradually increased, as the chief danger to be feared proceeds from excessive reaction—excessive as respects the depressed state of vital power upon which it supervenes—and the rapidity with which inordinate action exhausts the remaining irritability and vitality of the frame. The means found most successful in restoring a frost-bit limb, viz. a very gradual increase of temperature and cautious admission of stimuli, are required in such circumstances.

20. *B. The injurious effects from cold fluids taken into the stomach*, when the body is perspiring and exhausted, require instant aid. These effects somewhat resemble those proceeding from an injury sustained upon the epigastric region; and consist of quick, laborious, or gasping respiration, remarkable weakness and irregularity of the pulse, great collapse and pallor of the countenance and surface, rapid loss of the animal heat, vertigo, with dimness of vision, loss of hearing, &c., and general torpor, followed by coma and death—the one rapidly succeeding the other. In such cases, warm diluents, with ammonia, camphor, and opium; cordial diaphoretics, frictions of the limbs and surface generally with stimulating embrocations; hot fomentations, sinapisms, and cataplasms of Cayenne pepper to the epigastrium, and especially animal warmth applied to the surface, particularly the anterior surface of the trunk, are the chief means of recovery. The remedy much employed in foreign countries in cases of external injury on the epigastrium is obviously appropriate in such cases, viz. the application to this region of one of the lower animals the instant that it is killed and opened, and before it is skinned, or has lost any of its warmth.

21. iii. OF THE REMEDIAL OPERATION OF COLD.—It does not come within the scope of this work to enter fully into the therapeutical application of cold; but I will very succinctly notice the subject



at this place. *A.* As respects the *effect* we wish to procure from it, cold is employed, 1st, in a slight degree, or for a short period, in order to produce its indirectly tonic influence; 2d, in a greater amount relatively to the state of the system, to procure its directly sedative operation, without inducing in any considerable degree its consecutive or indirect effect; and, 3d, to obtain its astringent or constrictive influence on circulating canals and vessels. *B.* As to the *mode* of using it in order to produce either of these effects, much importance ought to be attached. It may be directed, 1st, to a part or the whole of the *external surface*—*a.* by sponging with, or the employment of a douche, or the affusion of a continuous stream of, cold water locally, or using a cooling lotion; *b.* by affusing over all the body some cold or tepid fluid, or by sponging the surface generally with it; *c.* by immersion in a cold or tepid bath: 2d, to the *internal surfaces*—*a.* by respiring a cool or even cold air; *b.* by the ingestion of cold liquids; and, *c.* by the injection of cold or tepid fluids into excreting canals or passages.

22. It is obvious, from what has been advanced, that the *mode* of using cold will determine its therapeutic *effects*, not absolutely however, but only relatively to the state of the system at the time, and the nature and stage of the complaint in which it is prescribed. Thus, cold air, the cold affusion, shower bath, douche, and plunge bath, will produce either an astringent, or a tonic, or a sedative operation, according to the length of time either of them is employed without remission; a brief or momentary use of either, whether directed to a part only, or to the whole, of the surface, being followed by its indirect or tonic action; and a prolonged use, by a more or less permanent sedative effect. In the treatment of diseases of debility, or states of depression, we require the former operation, and, suiting the *mode* of applying the remedy to the nature of the affection, resort to it momentarily, and repeat it frequently. In maladies attended with excitement, interrupted secretion, &c., we desire the latter effect, and prolong the application till we are satisfied as to the extent to which we have obtained it. In congestion and hæmorrhages we wish to obtain the astringent or constrictive operation of cold, and therefore resort to it in a sudden or impulsive manner, as in affusion, douche, or aspersion; and as this particular effect of cold appears to be connected, and to commence, with its sedative action, and to terminate with, or to be overcome by, the consecutive reaction, according as it may supervene, so are we guided in determining the degree and duration of the cold to be employed, in order to astringe congested or bleeding parts. In the appropriation of each of the *modes* of using this remedy, by which very opposite effects are thus to be obtained, the practitioner is guided by considerations arising out of its operation upon the various systems and organs of the body, by its effects directly exerted on the seat of its application, and by its sympathetic action upon parts remote from thence, and upon internal viscera. It is, therefore, obvious that much advantage in practice will accrue from our entertaining correct ideas as to its action upon internal organs, when applied to a part or the whole of the external surface. I have already stated, that cold—whether cold air or cold water

—constricts the whole cutaneous surface, and determines the flow of blood into the large trunks from the smaller canals and vessels (§ 5.); and that when directed for a short time, moderate reaction is usually brought about by this internal determination of the circulating fluid, and consequent excitation of the centres of nervous and circulating functions. This mode of operation must never be overlooked when employing cold as a remedy. The only question connected with it is, whether this constriction of the vessels near the external surface is limited to it, or extends sympathetically to internal parts. It is obvious, that, when the circulating fluid is propelled from one part, it must be determined to some other; but, whether does it accumulate in the large vessels, or retire both to them and to other surfaces? Pathological facts clearly show that the latter is most commonly the case. GIANNINI has, however, argued that the fluids are not driven upon the centre, but that constriction also takes place in internal viscera. That such an effect arises from the sudden and momentary shock produced by cold on the surface, and contributes to bring about the consecutive increased action, may be admitted, especially if it be employed locally, or in the vicinity of a congested or relaxed part; but when its action is of any considerable duration, or is directed to an extensive surface, the internal viscera must necessarily experience a proportionate increase of the circulating fluid. Thus, the brief affusion of a stream of cold water on the head, in cases of congestion of the encephalon, will tend to constrict the congested vessels, and remove the morbid condition, whilst a more general or prolonged application of cold will actually produce the very state, which this local use of it, in a sudden and momentary manner, is so efficient in removing.

23. In many cases, as in the excitement of fevers and acute inflammations, when the skin is hot and dry, we employ either local or general cold, with the simple view of abstracting a portion of the increased heat, which, owing to inordinate vascular action, and to the interruption of the perspiring and cooling function, becomes a morbid stimulus, and thus perpetuates the cause that originates it. It is obvious that cold, when judiciously employed in such cases, will even favour transpiration, and will lower excitement to that state which is compatible with a return of the secreting functions; but so much pathological knowledge and experienced discrimination are required to the advantageous or even safe employment of it, that no surprise can exist as to the disuse into which the practice has fallen. When the stage of excitement of continued and exanthematous fevers has been either imperfectly developed, or is about subsiding into collapse; when internal viscera are weakened and congested, and the skin is about regaining its interrupted function, the employment of cold in any way is attended by great risk, more especially when applied to the surface generally.

24. The good effects of cold applied to the head, in those diseases accompanied with an excited circulation in it, have induced various authors to recommend a similar practice in acute inflammations of the thoracic and abdominal viscera. There can be no doubt that the strictly local application of cold, as near as possible to



the organ affected, can be attended with no danger, particularly when the inflammation is acute, and chiefly attacks serous surfaces; and it may be in some instances productive of benefit; but we are still in want of faithfully observed facts to illustrate the effects of this treatment in a satisfactory manner. In hæmorrhagic affections, a judicious use of cold is often of great service—as the cold affusion or aspersion, the shower-bath, and cold sponging, in epistaxis and hæmoptysis; iced fluids taken into the stomach in hæmatemesis; enemata, and injections per vaginam, of cold liquids, in hæmorrhage from the bowels, menorrhagia, and flooding after delivery. Dr. DRAKE, of New York, has recently recommended very cold air to be respired in inflammations of the respiratory organs; but, from the admitted influence of cold air in increasing the activity of the respiratory functions, and, consequently, the phlogistic disposition of the circulation, it appears to me a practice of doubtful efficacy.

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COLIC. — DER. AND SYN. from κῶλον, Colon. Κῶλικὸν ἄλγος, Gr. Colica, Passio Colica, Dolor Colicus, Enteralgia, Colicodynia, Tormina, Auct. Var. Colique, Fr. Das Bauchgrimmen, die Kolik, Germ. Dolori Colici, Ital. Belly-Ach, Eng.

CLASSIF. 1. Class, Nervous Diseases;  
3. Order, Spasmodic Affections (Cullen).

1. Class, Diseases of Digestion; 1. Order, Affecting the Alimentary Canal (Good).

I. CLASS, I. ORDER (Author, in Preface).

1. DEFIN. Severe griping pains in the bowels, with costiveness, and often with vomiting.

2. Colic was formerly considered as seated chiefly, if not entirely, in the colon; but many

writers of the last three centuries have applied the term to acute pains of the bowels, attended by costiveness, and unaccompanied by fever, arising either from a primary affection of them, or from disease of some other viscus in their immediate vicinity, with which they are connected, and often sympathetically affected, through the medium of the ganglial nerves.

3. The first mention made of the disease, by the denomination *Colicus Dolor*, is to be found in CELSUS and PLINY; and, according to SENNERT and TRONCHIN, the same name was used by THEMISON and PHILON, physicians of the Augustine age, when, as SPRENGEL justly supposes, colic must, from the manners of that period, have been a common complaint. But, although the term colic appears not to have been in use, it cannot be supposed that such affections were before unknown. It is more probable that they were included under the general appellation of abdominal pains, in use from the time of Hippocrates. The greater number of modern writers have divided the disease into certain species or varieties, according to the presumed nature of its exciting causes and pathological states. SAUVAGES presents us, accordingly, with no less than 22 varieties. Dr. CULLEN arranges the *idiopathic* states of the colic into, 1st, The *Spasmodic*, either with stercoraceous vomiting, or with inflammation superadded; 2d, The *Colic of Poitou*; 3d, Colic from continued constipation; 4th, From acrid matters in the bowels; 5th, From retention of the meconium; 6th, From stricture of the bowels; and, 7th, From the obstruction occasioned by calculous formations. Dr. GOOD adopts a nearly similar division to the foregoing, preserving the 1st, 2d, 3d, and 6th varieties; and substituting for the others, Colic from Surfeit, and Colic from the generation of Flatulence — C. *Cibaria* and C. *Flatulenta*. M. PARISSET gives the following varieties:—the flatulent; the stercoraceous; the bilious; the inflammatory; the hæmorrhoidal; the menstrual; the spasmodic; the metastatic; from calculous and other hard bodies; the verminous; from organic changes in the bowels; and from lead. M. CHOMEL divides the disease into nearly the same varieties, and adds to them that arising from acerb or acid fruits, and fermented liquors, or *Colique Végétale*. The only additional arrangement of the forms of colic, which deserves being noticed, has been given by SCHMIDTMANN, as follows:—A. Inflammatory colic; B. Sanguineous or plethoric colic; C. From substances passing through or lodged in the bowels; D. From the metastasis or repression of other diseases; E. Flatulent colic; and F. Nervous colic. Each of these comprises several varieties, according to the exciting and proximate causes.

4. Colic, according to the extended acceptance of the word, arises from so many causes, and presents so many morbid relations, that a satisfactory arrangement of its different states is by no means an easy matter. I shall, however, attempt to group into distinct species those forms of the disease which resemble each other most nearly, or which arise from intimately related causes, noticing the peculiarities or modifications presented by the principal varieties. Those forms of colic which chiefly, or more immediately, depend upon a morbid state of the



intestinal canal will come *first* under consideration; and *next*, those which are symptomatic of, or complicated with, other diseases. In treating of the former, those states which are the most simple, and apparently consist of functional disturbance of the bowels, will be first noticed, and subsequently those which proceed from more complicated or organic causes. As I agree with BURSERI, CULLEN, GOOD, ABERCROMBIE, MONRO, and others, that *ileus* is often either an aggravated state, or advanced stage, of colic, or a consequence of organic or other causes affecting the calibre or canal of some part of the small or large intestines, I shall treat of it at this place, and after the more simple or less dangerous forms of colic have been discussed.

5. I. COLIC CHIEFLY AND PRIMARILY FROM FUNCTIONAL DISORDERS OF THE BOWELS.

- i. *Simple Colic*. SYN. *Colica Convulsiva*, Bonet; *C. Spasmodica*, Hoffmann; *C. Flatulenta*, Good, &c.; *C. Nerveuse*, Chomel; *C. Nervosa*, et *C. Spasmodica*, Schmidtman. CLASSIF. I. CLASS, I. ORDER (*Author*).

DEFIN. *Acute pain in the bowels, with occasional partial remissions, flatulent distension, or spasmodic contractions, or both, at the same time, relieved by pressure and the expulsion of flatus.*

6. There appear to be three morbid conditions of the intestinal canal, which more or less exist in the simplest as well as in the most severe and complicated forms of colic, and which evidently depend upon depressed vital power of the digestive canal: 1st, Morbidly increased sensibility and irritability of some part or the whole of the bowels; 2d, Irregular distension and spasmodic constriction of different parts of their canal; and, 3d, More or less copious generation of flatus in their tract, occasioning great distension and irregular reaction of the muscular tunics—the second morbid condition adduced. According as either of these states predominates above the others, the attack assumes a *nervous*, a *spasmodic*, or a *flatulent* character; and it has thus acquired these specific appellations from different authors.

7. *A*. The *nervous* form of the complaint occurs most commonly in females, and in persons of a nervous and irritable temperament, passing a sedentary or indolent life, and of a costive habit of body; sometimes without any evident cause, but often after inattention to the state of the bowels, exposure to cold, or some mental emotion or excitement. The attack is usually sudden, and the pain is felt in one or more places in the abdomen, but shifts its place frequently, and is exacerbated at irregular intervals. The face is pale and anxious; the abdomen is irregularly contracted, and pressure of it often affords slight relief. During the severity of the pains, a cold perspiration is forced out on the surface, and leipothymia, or sinking, is frequently complained of. The bowels are constipated, and borborygmi are constant. The duration of the attack is usually short—from one to several hours; and it generally terminates favourably; but repeated returns of the affection are very common, upon errors of diet, and from mental inquietude.

8. *B*. The more *flatulent* form of colic presents greater distension of the abdomen, the expulsion of flatus giving ease. The distension and pain are often traced along the course of the colon,

and are most complained of in the situation of the sigmoid flexure and cæcum. The quantity of flatus generated is often very great, and it evidently proceeds chiefly from irritation of the mucous surface of the bowels, giving rise to the separation of a gaseous fluid from the blood by the vessels of this surface; the matters retained in the prima via being insufficient to furnish, by their decomposition,—granting that they undergo this change,—so great a quantity of flatus as is generally voided. Owing to the irritation produced by the flatus, the bowels are inordinately distended in one part, and irregularly constricted in another; the part which was contracted, losing its tone, and becoming, after a time, greatly distended, and the distended portion experiencing, at intervals, irregular spasmodic constrictions. Thus the retained flatus is propelled from one part to the other, occasioning griping, shifting pains, and rumbling noises, or borborygmi, of the abdomen. The bowels are always constipated; and when evacuations are procured, they chiefly consist of hard lumps, and are accompanied with the escape of much flatus; the secreting functions of the bowels being evidently impeded. This modification of the complaint, as well as the preceding, is frequent in hysterical females, and persons of indolent habits, living much on vegetable diet, whose intestinal and biliary secretions are scanty, acrid, or otherwise vitiated; and their digestive functions weakened by indulgences.

9. *C*. The more *spasmodic* form of colic is in many cases merely a somewhat aggravated state of the preceding; the extremely painful spasmodic constriction predominating above the flatulent distension, and extending more or less to the abdominal muscles, giving rise to severe and irregular contractions, often with retraction, of the abdominal parietes. Whilst the two preceding varieties are very seldom attended by sickness or vomiting, unless in the severest states, this variety is frequently accompanied with this symptom; and, in its worst forms, vomiting, upon taking substances into the stomach, is very general. Constipation is also very obstinate; injudicious attempts at relieving it often increasing the vomiting, and converting simple colic into either enteritis or simple ileus. This form of colic often attacks those of spare habits of body, of the hypochondriacal and bilious temperaments, who live chiefly on coarse vegetable food, and are addicted to fermented or spirituous liquors.

10. ii. *Colic from the injurious Nature or Quantity of the Ingesta*. — *C. Accidental*, Willis and Cullen; *C. Végétale*, Chomel; *C. Cibaria*, Good.

DEFIN. *Severe twisting, griping pains in the abdomen, with vomiting, and rigid contractions of the abdominal parietes, followed, in some cases, by griping alvine evacuations, and looseness.*

11. *A*. This species of colic presents various modifications, according to the nature of the offending cause; and it has been accordingly differently described and named. Its states vary greatly in severity, according to the nature of the ingesta occasioning it, whether those of a solid or fluid kind. It may be here remarked, that the colic of Poitou, or *colica Pictorum* (which name has been very generally confounded with *colica pictorum*, or painters' colic), and the form of the



disease endemic in some other countries, although in many respects the same as lead or painters' colic, are evidently partly occasioned by the crude wines, new spirits, and the acerb and acid nature of the liquors in common use, as well as by lead, which is sometimes dissolved in them. (See *Lead Colic*, § 26.) CITESIUS, PISO, CARDAN, SENNERT, WEPFER, and many recent authors, have imputed the endemic of *Poitou*, *Madrid*, and other places, entirely to the nature of the ingesta, into many of which mineral substances could in no way enter. The evidence furnished by their writings, and in the treatises of GRASHUIS and TRONCHIN, and my own experience, favour the opinion that acid and acerb liquors are often concerned in the production of colic, without the aid of lead; to which, however, the most severe cases, and those accompanied with paralysis, are attributable, as shown by Sir G. BAKER. Dr. BATEMAN doubts the power of these ingesta, independently of their impregnation with lead, to produce the disease. His opinion is, nevertheless, opposed by the fact, that a large proportion of the cases of colic which occur in districts where acid and spirituous liquors are much used, is not attended by the paralytic and other symptoms characteristic of lead colic, and that many of them run on to dysentery. Whether or not the colic stated by KÆMPFER to prevail in Japan, owing to the use of fermented beverages prepared from rice, depended on the presence of lead, cannot be ascertained. I had means of knowing that the colic so prevalent among the natives of Africa is clearly owing to the excessive use, particularly when over-heated, fatigued, or covered by perspiration, of the acid beverages prepared from the juice of the palm and other trees, and in the making of which no sort of metal utensil, or of glazed pottery, is at all employed. LINNÆUS imputes the prevalence of the complaint among the Laplanders to the use of stagnant water, containing small worms, &c. In various parts of the north of Europe, where butter-milk whey, and vegetable infusions, are fermented into very acid liquors, and used for common drink, most severe attacks of colic follow their ingestion in a cold state, particularly when the body is perspiring. Dr. CHISHOLM attributed the prevalence of colic in Devonshire to the abuse of cider in summer and autumn, by the labourers, when busily engaged in the hay and corn harvest—the cold acerb cider inducing a spasmodic state of the bowels in persons over-heated by laborious exertion.

12. *B.* Various articles of food will occasionally disagree from some peculiar idiosyncrasy, the articles themselves not being injurious. Such is sometimes the case, when a person, who has been living sparingly, indulges in a too full meal, or partakes of a substance to which the stomach, the functions of which are perhaps weak, is unaccustomed. Pork, cooked very soon after being killed, particularly if used as an article of diet in warm climates, is very apt to produce attacks of colic, followed by griping evacuations from the bowels. A similar effect often is induced by blown or tainted meat, mildewed wheat or rye, and by cold, acerb, indigestible, or unwholesome fruits, as cucumber, melon, &c. The injudicious use of cold griping purgatives, as senna, &c., will often, if not properly combined with

other medicines, occasion this state of colic in hypochondriacal, bilious, or phlegmatic habits.

13. Most severe effects often follow the ingestion of poisonous fish, muscles, lobsters, mushrooms, &c., and of the minute fungi sometimes formed on smoked meat and sausages, or on cheese. But the colic which is produced in these cases is the least dangerous part of the mischief; the affection of the nervous and vascular systems being often of still greater importance. Instead, therefore, of considering the effects of these substances as varieties of colic, as Dr. GOOD has done, I have viewed the disorder of the stomach and bowels as a part only of the circle of morbid actions they occasion, and have therefore treated of them in the article POISONS.

14. The presence of *arsenic* in wines, or the fumes of this metal; preparations of *antimony*, *copper*, or *zinc*; and the accidental solution of these, or conversion of them into a salt by substances about to be received into the stomach; are often productive of disorder, of which colic is one of the most prominent features, generally attended by vomiting, and sometimes followed by looseness, or by tenesmus and dysenteric symptoms. Lead colic is very often occasioned by the ingestion of the metal in some state or other by the mouth, and should therefore be treated of at this place, but the peculiarities of this variety require for it a separate consideration. Many substances occasion, when taken in hurtful quantities, effects of which colic is among the most prominent; but which, as they present certain diversities, are described in a separate article. (See POISONS.)

15. *C. Infants*, especially from birth to the termination of teething, and occasionally older children, are very liable to this form of colic. The state of the mother's milk, arising from the want of health, or manner of living, the irritation connected with dentition, too early feeding, too much or inappropriate food, acidity of the *prima via* resulting therefrom, and want of attention to the bowels, are the most common causes of this complaint among infants. In children it is often produced by acerb or unripe fruit, and by cold. In very young subjects it is characterised by more or less flatulence, screaming, tossing of the arms, and forcible drawing up of the lower extremities upon the abdomen, with vomiting, costive bowels, and greenish, offensive, and acid evacuations; followed by looseness; or free evacuations attended by tormina.

16. *iii. Colic from a morbid State of the Secretions poured into the Bowels, and Retention of the Excretions.*—*Colica Atrabiliaris*, Meyseray; *C. Biliosa*, Hoffmann; *C. Stercorea*, Ettmuller, Sauvages, and Cullen; *C. Pituitosa*, Sennert, Fernel, &c.; *C. Stercorale*, et *C. Bilieuse*, Pariset; *C. Constipata*, Good; *C. Biliosa*, et *C. Stercoracea*, Schmidtman; *Hepatic Ileus*, Musgrave; *Colica Madridensis*, et *C. Hispaniensis*, Auct. Var. *Dry Belly-Ache*.

DEFIN. Severe griping pain, with porraceous or bilious vomitings, constipation, or scanty evacuations, and often with hiccup, tension of the abdomen, and restlessness, the motions procured presenting various morbid appearances.

17. This species of colic has been differently described, and named as above, according to the views entertained respecting its nature. We



have seen that the *first* variety of the disease consists of various morbid states, chiefly characterised by deficient function and altered sensibility of the bowels, &c.; and that the *second* variety is principally occasioned by the nature and quantity of the ingesta. The variety which I next have to consider comprises certain forms of disorder arising mainly from the morbid condition of the secretions and fæcal matters contained in the bowels, but aided by other causes; and it may be divided into, *a.* The colic of infants, caused by retained meconium; *b.* Colic arising from accumulated fæcal matters in the bowels; and, *c.* From the irritation of morbid secretions poured into the intestines from the liver, &c.

18. *A.* The colic which is owing to the retention of the meconium (*C. Meconialis*, SAUVAGES and GOOD,) in new-born infants, is chiefly met with in those who have either not been sufficiently early put to the mother's breast; or who have been suckled by a nurse, or brought up by hand. The milk which is first secreted, possesses purgative qualities, intended by Nature to promote the expulsion of the secretions, which had accumulated in the prima via during the latter period of foetal life; and when the infant enjoys not this requisite kind both of nourishment and medicine, the meconium is retained, becomes viscid, acid, and irritating to the bowels, occasioning costiveness, distension, screaming, drawing up of the lower extremities, sickness, &c.

19. *B.* It is evident that the retention in the cæcum and cells of the colon, of those excrementitious matters which require to be thrown off from the bowels, will be productive of more or less disorder. Such retention usually occurs very early, and in advanced life; in those who pass an indolent existence, or are engaged in sedentary occupations; in persons whose bowels are torpid from debility or exhausted sensibility; in females who are pregnant, or who are of an advanced age; and in men who have old herniæ. It is often preceded by indigestion, cardialgia, constipation of the bowels, and fullness about the cæcum, the sigmoid flexure, and occasionally the whole course of the colon. In many cases, large accumulations in the CÆCUM or COLON (see these articles), may be detected by manual examination. Sickness and vomiting, however, seldom come on until abdominal griping pain has been for some time complained of, and the stomach has been irritated by acrid purgatives. Later in the complaint, the abdomen becomes tense, tumid, and painful on pressure; the pulse accelerated; and the tongue, which was from the commencement loaded at the root, more foul or furred. This form of the disease is very apt to terminate in dysentery, enteritis, or ileus.

20. *C.* The form of colic which occurs, and even prevails, in some of the West India islands, has often been confounded with lead colic, from the supposition that the new rum drunk in these islands contains lead in solution. MR. QUIER, Dr. CHISHOLM, and Dr. THOMSON, who resided long in the West Indies, state that this disease is not so common as formerly in these islands, owing to the improvement in morals, and the use of warmer clothing; and that nothing is more erroneous than attributing it to the poison of lead. These physicians refer it to the intemperate use of spirits, and to alternations of heat and cold.

MR. QUIER and Dr. MUSGRAVE, who have given a very detailed account of this complaint, as they observed it in Jamaica and Antigua, where it is of frequent occurrence, state positively that lead is not concerned in its production. From the history they have given of this endemic colic of the West Indies; and from the descriptions of the colic, which is perhaps the most common disease in Madrid and several provinces of Spain, furnished by MM. PASCAL and MARQUAND, who treated many hundred cases of it in the French army that occupied Spain during the peninsular war, and in 1824—all which accounts are now before me; I conclude that the colic of Spain and that of the West Indies depend upon the same causes—evidently of an endemic kind; are characterised by similar symptoms; run the same course, evince similar lesions, and are cured by the same treatment. Indeed, I have seldom met descriptions of any disease so much alike as those furnished by Dr. MUSGRAVE and by M. MARQUAND, who himself had the complaint, the causes and treatment of which he has so ably investigated. After examining the causes to which writers, particularly HOFFMANN and THIERY, and others copying them, have imputed this affection, viz. to lead and metallic substances dissolved by acid wines, &c., M. MARQUAND states those to which the natives attribute it; namely, the use of vegetable acids and unripe indigestible fruits; large draughts of wine and water, and of much milk; and insufficient clothing on the trunk of the body and abdominal regions. But these causes, he remarks, are in operation in many places of Spain and Portugal where colic is rare, and therefore some endemic cause not yet discovered must be in operation. M. LARREY imputes it to atmospheric vicissitudes and acid beverages, and designates it "*Colique bilieuse rheumatismale*," MM. AULAGNIER, LIBRON, and JACOB, who have had extensive experience of this disease in Spain, concur with M. MARQUAND in denying the influence of lead in producing it; and think that its causes are not yet fully ascertained. The negative information furnished by these writers, the character of the symptoms, and particularly the appearance of the evacuations, would lead me to infer that, in both the colic of Spain and the colic of the West Indies, endemic causes,—especially those which proceed from the soil, and produce intermittent and remittent fevers,—impede the functions of the liver and intestinal surface, and occasion an accumulation in the hepatic ducts, gall-bladder, and prima via, of acrid or otherwise morbid secretions, which, owing to their irritation, or to concurrent or determining causes, give rise to a series of painful and diseased actions, and imperfect or abortive attempts at their evacuation. The symptoms referrible to the liver—its congestion—the signs of irritation about the duodenum, the vitiated dark appearance of the stools, and the relief obtained from free alvine evacuations, are proofs of this position.

21. *Symptoms.*—The patient generally experiences premonitory symptoms before the accession of the attack. These consist of dull and pressing pains in the whole course of the colon, but particularly in its arch; loss of appetite; irritability of temper; and difficulty in evacuating the bowels, which, however, are not costive. The patient has often several evacuations in the course of the



day, but in small quantity, and with much flatus; and he experiences less distress in bed than when he is up. The tongue is moist, and loaded only at the root; and there is much thirst. These symptoms usually continue two or three days: about the third, the patient has no longer any desire to go to stool, and evacuates no more flatus; but the pain becomes more severe, and more fixed and constant at the epigastrium, with a twisting pain at the umbilicus: the countenance is pale, and expressive of pain and anxiety; the pulse is slow, small, regular, and constricted, but not febrile; the skin is dry, but not hot; and the urine is scanty, but not otherwise unnatural. The patient often sits with his arms crossed over, and pressed upon, the abdomen, and the trunk bent forwards. If he be in bed, the thighs are pressed up upon the belly. Along with these symptoms, and generally soon after the accession of constipation, porraceous or bilious vomitings come on, commonly in small quantities, mixed with glairy matters, or those last taken into the stomach, and accompanied with hiccup. There is no sleep, but a continued restlessness: the pain is now nearly constant, and most severe, particularly about the epigastrium and umbilicus, and is not ameliorated by any position. As the malady proceeds, the thirst increases; and the fluids taken generally aggravate the hiccup, and are soon thrown off. The eyes are sometimes slightly yellow, and the whole surface rather sallow. The patient is distressed by the continued severity of the pain, the hiccup, and the want of sleep; wandering and delirium comes on, sometimes with deafness, epileptic convulsions, and rarely with feculent vomiting; these latter symptoms generally portending a fatal result.

22. This disease, left to itself, usually runs its course in eight or ten days, and rarely extends beyond the fifteenth. Pain or uneasiness in the right hyponchondrium is often felt some time before the attack, and occasionally not until the advanced progress of it. In some cases, the pain and vomiting cease, upon the free spontaneous excretion of flatus, with dark, hard motions: but occasionally they return after a short time, and black atrabilious matter is thrown off the stomach. The discharge from the bowels is generally very morbid, offensive, and of a dark, blackish, or deep green colour. In other cases, where the patient has been neglected or improperly treated, chronic debility, with marasmus, and, more rarely, paralysis, supervenes, and usually terminates fatally. The abdomen is seldom much retracted, excepting about the umbilicus; but, at the last or fatal stage of the disease, it is much distended. The bowels usually resist the action of the most powerful purgatives at its advanced period, and injections are thrown up or retained with difficulty.

23. *Prognosis.*—*a.* A favourable issue is indicated by free evacuations, followed by amelioration of the abdominal pain and vomiting, by the circumstance of the pulse remaining below 100 beats in the minute, and the non-supervention or subsidence of hiccup. *b.* An unfavourable result is preceded by more or less tenderness, tension, and tumefaction of the abdomen; by a pulse above 100; by obstinate constipation, and immediate return of the injections; by the

severity and continuance of singultus; by dryness of the tongue, and increased restlessness and tossing.

24. *Dissection* has thrown little light on the nature of the disease. M. MARQUAND, whose experience was extensive, considers that whatever change of structure is observed, is merely a contingent circumstance, or accidental complication. M. PASCAL states, as the result of the examinations he made of six fatal cases, that little or no lesion was observed in any part of the alimentary canal, excepting slight redness of the mucous surface of the duodenum: the gall-bladder was loaded with thick bile; but the other viscera were natural. He further states, that he found the sympathetic ganglia injected. A perusal, however, of his description of the appearances presented by them, impresses me with the belief that what he considered to be unusual vascularity, was not more than they always present in the healthy state.

25. iv. *Colic from the Poison of Lead.*—SYN. *Colica Saturnina*, C. Pictorum, C. Pictorum, Auct. Var. C. *Rhachialgia* (ραχιᾶλγία, *Spine-Ach*), Astruc, Good; C. *du Poitou*, C. *de Plomb*, C. *Métallique*, *Rachialgie Metallique*, Auct. Gall. *Bleicolik*, *Trocken Colick*, Germ. *Devonshire Colic*, *Painters' Colic*, *Lead Colic*, &c.

DEFIN. *Dull remitting pain, becoming constant and violent, extending to the back and upper and lower extremities; vomiting, obstinate constipation, often followed by paralysis.*

26. I have already noticed the fact of this disease being often confounded both with the form of colic produced by acid and acerb ingesta (§ 11.), and with that depending upon a morbid state of the secretions poured into the intestinal canal (§ 20.). Lead colic chiefly attacks house-painters and plumbers, workers in the different preparations of lead, glaziers of earthenware, miners, ornamental and water-painters, gilders, and rarely chemists and printers. It is very probable that the colic so prevalent in Devonshire, Poitou, and, according to TRONCHIN and WANSTROOSTWYCK, in Haarlem and Ains'erdam, arises in some instances from a portion of lead contained in acid beverages, and possibly from the water used for domestic purposes; but that the endemic colic of the West Indies and Spain is occasioned by lead, as many suppose, has been disproved, as we have seen, by the more accurate observations of modern enquirers, especially directed to this point. Lead colic arises not only from the introduction of the mineral into the system along with the ingesta, but also from its oxides being allowed to remain in contact with the surface of the body; as in the case of workers in lead, as shown by LENTIN, BRAMBILLA, Sir G. BAKER, and Dr. REYNOLDS; and from the volatilised fumes of lead floating in the air, in recently painted apartments, as observed by PERCIVAL, HENCKEL, GARDANNE, BADELEY, and GOOD. It is extremely probable that lead produces a more injurious action upon some constitutions than upon others; and that its oxides and sub-salts are more injurious than its super-acetate. The most quickly, and sometimes the most powerfully, injurious operation of lead is when its oxide is mixed principally with turpentine, for the purposes of house-



painting. This spirit carries along with it, during its volatilisation, a portion of the oxide, and thus poisons the respired air, thereby affecting the respiratory nerves and even the blood itself. Soon after Sir G. BAKER's investigation of the effects of lead, and of the substances which either contained, or might by possibility contain it, was made public, every thing which came in contact with lead in any form was viewed with suspicion. Dr. PERCIVAL first demonstrated the folly of these apprehensions; and although the water which supplies a million and a half of persons in this metropolis passes through leaden pipes, and is long retained in leaden cisterns, which are often allowed to become foul, yet, I believe, that no case of lead colic occurs from this cause, excepting in those who are affected by lead in a different and manifest manner. Dr. BATEMAN never met with a case in London which could not be traced to this source; and I certainly never did, notwithstanding the readiness with which the effects of lead are produced in some persons. Although lead is thus the efficient cause of the complaint, it is not always the only cause. Thus, the acid beverages or spirits in which the food is taken may determine its effects; or an attack may be induced, in a person imbued with the lead poison, by improper ingesta, spirituous liquors, exposure to cold, and by sulphureous waters, or sulphureted medicines, and cold gripping purgatives. Cases have been recorded by Dr. WALL and Sir G. BAKER, where the external medical use of the preparations of lead occasioned the disease, but such are of rare occurrence.

27. *Symptoms.* — Lead colic usually commences with obscure pain of the abdomen, which becomes, at first, at intervals, so severe, that the patient screams, tosses himself about, and vainly seeks a posture that will lessen his sufferings. Some lie for a while on the abdomen, and others press upon or rub this part with the hand. The pain is generally greatest at the pit of the stomach, and as the disease proceeds, extends to the back, upwards to the arms, and downwards to the loins, thighs, and legs. A twisting pain is also generally felt about the navel, which is at first drawn inwards; and cutting pains shoot at times with great violence to both hypochondria and iliac fossæ, and through the abdominal muscles. The voluntary muscles often become so sore that they cannot bear the slightest pressure; and the pain frequently alternates between the stomach and bowels and the external muscles. Sickness and constipation are early symptoms, — the matter thrown off the stomach consisting of a slimy fluid, either with or without acrid deranged bile, which is continually being secreted, accumulates, irritates, and is evacuated. To these are generally added bitter eructations, hiccup, severe headach, pains of the wrists, hands, ancles, soles of the feet, &c.; and frequently of the shoulders and neck. These symptoms are aggravated during the night, depriving the patient of a moment's repose. The pulse is not, at first, affected — sometimes in no measure throughout the disease; in many cases it is below the usual standard, and in others quicker and weaker, more rarely fuller or stronger. The tongue is pale, moist, and soft, without erection of the papillæ. The skin is commonly soft and moist; it is rarely hot. The urine is various, but more frequently

copious than otherwise. Costiveness continues as the disease advances; sometimes a gripping disposition to stool occurs; and if any fæces are passed, they are scybalous, hard, resemble sheep's dung, and are mixed with a dirty watery fluid containing a dark slime, and occasionally a little blood. M. MERAT analysed the matters evacuated, but could not detect any lead in them. The abdomen is insensible to pressure; in some instances rigid and knotted; but in the latter stage often distended and slightly painful, chiefly from the distension of the bowels, and affection of the muscles. In the cases which have occurred in my practice, distension of the abdomen was as frequent as retraction, owing evidently to inflation and fæcal engorgement of the colon, the course of which could be distinctly traced under the abdominal parietes. M. ANDRAL has also met with a similar state of this cavity. In some cases I have remarked considerable retraction around the umbilicus, while all the rest of the abdomen in the course of the colon was greatly distended. Dr. MUNRO states that the sphincters of the bladder and rectum are sometimes so contracted that the urine and fæces cannot be voided. I have observed this chiefly as respects the sphincter ani — a clyster pipe being with difficulty introduced. If the complaint be not soon ameliorated, the pains of the back, loins, and limbs become more violent, and are attended by extreme weakness, tremulousness, and even partial or complete paralysis, particularly of the extensor muscles. In some cases, dyspnœa, palpitations, and a short dry cough, are complained of, seemingly owing to the pressure of the inflated colon upon the diaphragm; and occasionally epilepsy, coma, or even apoplexy, supervenes.

28. *Duration, Complications, and Prognosis.* — A. The duration of the attack varies from two or three to twenty-five days. M. RANQUE found that, out of 147 cases, 129 recovered between the second and the thirteenth day of treatment, and the remainder before the twenty-sixth day. But relapses, or rather returns, of the complaint are most common. I have met with instances of a ninth and tenth attack; and more numerous seizures have occurred in the practice of others. In more unfavourable cases, the disease continues for weeks, or even months, with occasional intermissions; but such may be viewed as a succession of attacks, and occur chiefly in drunken workers in lead — addiction to spirits aggravating and reproducing the effects of lead on the system.

29. B. This disease is sometimes complicated with epilepsy; more frequently with palsy, in which it often terminates; and rarely with inflammation of some one of the abdominal viscera, and with mania or delirium.

30. C. The prognosis is favourable when the symptoms are mild, or are ameliorated by treatment; but it should be given with caution and reservation when the attack is very severe, is attended by hiccup, by obstinate and continued vomiting, by tremulousness, and by distension of the abdomen. It should be unfavourable, if complications (§ 29.) appear in its course; or if deafness, blindness, fæcal vomiting, and symptoms of ileus, supervene.

31. *Appearances observed on dissection.* — Lead colic is most commonly fatal from the complications that occur in its course. In its



simple state it seldom terminates in death. The examinations made by SENAC, ASTRUC, and BORDIEU, furnish nothing satisfactory. STOLL observed the gall-bladder loaded with dark bile: Sir G. BAKER describes the bowels as being perfectly natural throughout, and the muscles pale and wasted. DE HAEN states, that he found contractions of the colon and cæcum in all the cases he opened. M. MERAT examined seven cases, which he says presented the same appearances as those described by DE HAEN; whilst M. ANDRAL details six cases, in all of which no such contractions were observed, nor any other morbid change of the alimentary canal. M. LOUIS, also, found no alteration in the bowels. Most of those who die of this disease are carried off in epileptic convulsions, or have had paralytic symptoms. The state of the cerebro-spinal axis is hence deserving of examination. M. ANDRAL, however, states, that he detected no lesion of the brain, nor of the spinal chord, nor of the voluntary nerves. A case I had an opportunity of examining confirms the observations of Sir G. BAKER and ANDRAL.\*

32. II. COLIC ARISING MOST FREQUENTLY FROM CHANGE OF STRUCTURE OR RELATIVE POSITION OF THE BOWELS.—CLASSIF. IV. CLASS, I. ORDER (*Author*).

i. *Colic from Mechanical Obstruction of the Canal of the Bowel*.—SYN. *C. Calculosa* et *C. Scirrhus*, Bonet, Chomel, Lamotte; *C. Constricta*, Good.

DEFIN. *Costive, flatulent state of the bowels, attended by passing colicky pains, relieved by liquid, difficult motions, and often accompanied by a sensation of constriction; tumour or difficulty in a particular part of the abdomen.*

33. Considerable mechanical difficulty is often experienced for some time before a severe attack of colic or ileus takes place. A patient, whom I have long attended for slight colic pains, and irregular state of the bowels, without full or satisfactory evacuations, states, that a sensation of soreness in the situation of the arch, and of difficult passage to the left flexure of the colon, with painful distension about the cæcum and right side, are often felt shortly before an evacuation. Dr. MONRO remarks that stricture of the bowels in its early stage occasions costiveness, alternating with diarrhoea and colic pains. If the obstruction be low in the bowels, solid fæces are either not passed, or they are of small quan-

tity and slender calibre. These strictures are most commonly met with in the colon; and their situation, in some cases, may be inferred from the sensations of the patient, and the symptoms observed in examining the abdomen: they are fully described in the article on *Morbid Structures of the Digestive Canal*. (See also arts. *CÆCUM*, and *INTESTINES*.) When colic is owing to the presence of concretions, stones of fruit, &c. in the bowels, distinct hardness, or even tumour, is sometimes felt; but, in many instances, no such change can be detected, although the patient generally refers to some part of the abdomen as presenting a fixed pain, or obstacle to the functions of the intestines. (See art. *CONCRETIONS—Intestinal*.) In all cases of colic pains arising from the above pathological states, great distension and tenderness of the abdomen often speedily come on, partly owing to inordinate dilatation of that portion of the canal above the obstruction. Sickness also at stomach, and vomitings, generally precede or follow these symptoms, with restlessness and distress; and the complaint soon assumes all the characters of ileus, unless the retained matters pass the obstacle, or the obstructing body itself be propelled downwards and evacuated, as is often the case in respect of biliary and other concretions. When colic proceeds from incipient mechanical obstacles in the intestinal canal, the symptoms are less violent; but they are of frequent recurrence, until the obstruction is removed, or they increase so as to produce inflammation of the bowels or ileus.

34. ii. *Colic, with complete Obstruction of the Bowels, and Stercoraceous Vomiting, Ileus, Volvulus*—SYN. *Εἰλέος* (from *εἰλέω*, I constringe), Hipp. *Εἰλέον* (from *εἰλέω*, volvo, I roll about—hence, *volvulus*), Aretæus. *Χωροδαψος* (from *χορδή*, a chord, and *ἄπτω*, I kill), Galen. *Morbus tenui Intestini*, Celsus. *Acutum Tormentum*, Cœl. Aurel. *Iliaca Passio*, *Iliacus Morbus*, *Chordapsus*, *Miserere*, *Dolor Ileus Spasmodicus*, Auct. Var. *Volvulus*, Baillou. *Ileus Verus*, Sydenham. *Ileus Spasmodicus*, Sauvages. *Colica Ileus*, Good. *Passion Iliaque*, Fr. *Darmgicht*, Germ. *Volvolo-passione Iliaca*, Ital. *Iliac Passion*, Eng.

DEFIN. *Violent griping pain, obstinate constipation, with retraction of the navel, and spasms of the abdominal muscles, tension, tenderness and distension of the abdomen ultimately supervening, and generally with stercoraceous vomitings.*

\* Mr. BYAM and myself recently examined the body of a painter, who died at the age of 78. He had been a very strong man, and in constant employment all his life up to a few days before his death. He died of hæmatemesis, from disease of a branch of the coronary artery of the stomach. The substance of the heart was soft and flabby. The small and large intestines were sound; the liver was studded with collections of a pultaceous semifluid matter, of a greyish white colour, contained in very thin cysts, from the size of a hazel nut to a walnut, the portions of liver surrounding them being softened and of a dark red colour. The top of the anterior mediastinum, and space behind the top of the sternum, contained an immense mass, nearly the size of the closed hand, of enlarged glands, of a cheesy consistence and appearance; and a similar change of the absorbent glands existed behind the arch of the aorta, the superior cava, &c., extending in the form of a long cushion down the vertebræ into the abdomen. The small arch of the stomach, the pylorus, and commencement of the duodenum, were remarkably thickened, from the deposition of adventitious matter, the thickened mass nearly approaching the characters of scirrhus. The coats of the arteries of the stomach were diseased, and contained atheromatous matter.

35. GALEN, and after him, VAN SWIETEN, viewed ileus as merely a form of inflammation of the bowels. Others, particularly SAUVAGES, BARTHEZ, CULLEN, PINEL, and ALIPIERT, ascribed to it chiefly a nervous or spasmodic character. Many writers of the last century have divided it into idiopathic and symptomatic; whilst M. RAIGE DELORME, and others, have disputed its idiopathic nature, and particularly its nervous origin, and have considered it, as it, doubtless, most frequently is, a consequence of mechanical obstruction, inflammation, or some pre-existing disease. There can, however, be no doubt, although many of the cases observed may have been merely severe instances of colic, in which the proper symptoms of ileus had not come on, that it sometimes occurs as a simple



and idiopathic disease, as BARTHEZ, MAXWELL, and Dr. ABERCROMBIE have demonstrated; and that dissections of fatal cases sometimes present no morbid change sufficient to explain the symptoms or to account for the result. In the cases recorded by BARTHEZ and MAXWELL *feculent vomiting*, and the discharge by the mouth of matter thrown into the colon, are described to have occurred, and yet recovery took place. In many instances, perhaps the majority, ileus supervenes on one or other of the forms of colic already described; or, in other words, certain pathological states commence with symptoms, which, in the *tout ensemble*, constitute some one of the forms of colic described, and terminate in fully developed ileus. Such terminations are most common in the second, third, and fourth varieties of colic. But in rare instances, ileus comes on suddenly, with the most violent abdominal pain and vomiting, the patient tossing about in the utmost agony, the other symptoms of the disease rapidly appearing, and most frequently terminating fatally.\*

36. *History*.—Ileus is either preceded by constipation and colicky pains, or it is a more intense form of colic from the commencement, the symptoms differing only in degree. Early in the disease, constipation; twisting and violent pain about the umbilicus, sometimes not aggravated by, but even alleviated by pressure; constant retchings; absence of fever, and a pulse not exceeding, or even below, the natural standard, are the usual signs. If relief be not soon procured, the abdomen enlarges, and becomes tense, tender, and tympanitic; the countenance is anxious and collapsed; *feculent matters* are ejected by the mouth; the pulse becomes frequent, small, and constricted, the thirst urgent; and violent tormina, with ineffectual attempts at evacuation of the bowels, hiccup, failure of the mental energies and vital powers, with cold, clammy, and partial sweats, cold extremities, cold, sunk features, leipothymia, and sinkings, supervene. In many cases, inflammatory symptoms appear early in the course of the malady, and pass rapidly into those indicating the commencement of gangrene. The state of the tongue is different in different cases, and stages of the complaint. It is occasionally not materially changed. Often the disease is referrible at its commencement to no particular region of the abdomen; but as frequently the patient refers his sufferings to a particular part, — sometimes to the ileo-cæcal region, occasionally

to the situation of the sigmoid flexure of the colon; in some cases, in the course of the right or transverse colon; in others, above or about the umbilicus, or low in the iliac and pubic regions. In all such cases, we may suspect mechanical obstruction arising from some one or other of the following causes, which have been repeatedly discovered on dissection: —

37. *Changes observed in fatal cases*.—1. Great distension, as if from paralysis of the muscular coat of a large portion of the small intestines, without inflammation or any other change. 2. Dilatation, with a chord-like contraction, in either the small intestines, or in the large; more frequently the latter. 3. Dilatation, with inflammation, lividity, and exudation of lymph on the serous surface. 4. This latter state, conjoined with gangrene, and either with or without exudation, occurring in the small or large intestines; more frequently in the former. 5. These changes combined with contractions, — occasionally only one, often more, the intervening parts being dilated, — in some part of the bowels. 6. Unnatural convolutions, twists, loops, or knots, in some part of the small intestines. 7. Various convolutions, or duplicatures, or twistings in the large bowel, with an appearance of elongation owing to relaxation or paralysis of the longitudinal bands of muscular fibres. 8. These latter, conjoined with recent or old cellular adhesions of the opposing serous surfaces of the duplicated portions. 9. One or more intorsusceptions; the intorsuscepted portion being either in a downward or upward direction, sometimes uninfamed, as in infants and children; frequently inflamed, adherent by lymph, or gangrenous, particularly in adults; and occurring in any part of the intestinal tube. 10. Old adhesions of one part of the small or large intestines to another, or to the parietes of the abdomen, or to the omentum, or some other viscus, without obstruction of the canal. 11. Similar adhesions occurring in reduced or old herniæ, or in herniæ for which an operation had been performed and the bowel returned. 12. Filamentous or cellular bands confining or encircling a portion of intestine, sometimes after reduction of hernia, occasionally in a large and irreducible hernia, and even where no hernia had existed (GARTHSHORE, MOREAU, MOSCATI, WALTHER, ABERCROMBIE, myself, and others). 13. Adhesions of the appendix of the cæcum to some part, after passing over or around, and strangulating a portion of intestine. (See art. CÆCUM.) 14. Strangulation of a portion of one side of the intestine in the femoral arch, without producing any tumour, and without obliterating, or even sensibly diminishing the canal of the bowel.\* 15. Various states and forms of internal strangulation, often produced by old adhesions formed between opposing portions of the serous surface, more commonly low in, or about the middle of the abdomen, — by portions of omentum, — by rents in the omentum through which a portion of intestine had passed, and by various adhesions, obstructions, and changes in the position of parts of the bowels. 16. Strangulation in the mesentery, owing to partial adhesions (SWAMMERDAM). 17. Various states of contraction in the small and

\* Professor —, of Berlin, during his visit to London, was attacked the day after dining with a party of scientific men, when he sat with his back to a large fire. I was called to him, and found him in the utmost agony, with a pulse of natural frequency; his abdomen tense, tympanitic, and subsequently tender to the touch. What he vomited at first consisted of half digested substances; subsequently it was mixed with matters which had apparently come from the upper part of the small intestines. Calomel and opium were administered, and oleaginous enemata repeatedly thrown up. A flexible bougie was introduced its whole length, and large glisters were injected without difficulty; but the latter were returned soon after without any effect. The abdomen increased in size; mental distress and debility became extreme; the matters rejected by the mouth were more obviously *feculent*; hiccup and leipothymia appeared, and he died in two days. An examination was not permitted. The characters of the attack suggested the idea of a paralysed state of the bowels, with inverted action of their upper portion, gradually extending downwards. The origin of the sufferings was not referred to any particular part of the abdomen, nor had any obstruction been previously complained of.

\* This occurred in a female servant of the author, who was seized with ileus, without any antecedent disorder.



large intestines from organic changes in their coats, more particularly about the cæcum, sigmoid flexure of the colon and rectum, as scirrhus, fungus, soft cancer, &c. (DE HAEN, RHAN, HODGES, THOMANN, HOWSHIP, ANNESLEY, ABERCROMBIE, TRAVERS, &c.). 18. Internal polypous or malignant excrescences, or external diverticula (PORTAL, CLOQUET, COPLAND HUTCHISON, &c.). 19. Obstructions of the canal of some part by biliary and intestinal concretions, stones of fruit, bones, indurated fæces, and balls of worms. 20. The pressure of encysted or other tumours, abscesses, &c. in the pancreas, kidneys, omentum, uterus, ovaria\*, or between these latter and the rectum. 21. And lastly, The circumstance of ileus being produced by herniæ, both of the more common kinds, and of those that are uncommon, as hernia of the ischiatic notch, diaphragmatic hernia, &c., should not be overlooked. Of these, and even of other internal changes productive of ileus, numerous instances are to be found in the works to which I have referred at the end of this article, at the places pointed out. (See also arts. CÆCUM, COLON, CONSTIPATION, DIGESTIVE CANAL, INTES-  
TINES, &c.)

38. *Of Volvulus, or Ileus arising from intus-susception.*—*a.* The invagination of one or more portions of intestine is not infrequently met with in post mortem examinations; and on some occasions its existence may be known during the life of the patient. The number of intus-suscepted portions may vary from one to ten; the greater number being most frequently met with in children, amongst whom invagination is also most common. In this class of patients it is frequently unconnected with any marks of inflammation; and, from the healthy appearance of the part thus affected, and the facility with which the invaginated portion is replaced, it seems probable that intus-susception has taken place, either very shortly before, or at the period of death. In the majority of instances it is an accidental consequence of pre-existing disease, most frequently of the intestinal canal, arising from an irregular action of the muscular tunics, occasioned by irritation of the mucous surface. Thus worms have been found in or near the invaginated part: and in adults it is generally observed in connection with inflammatory action of some one of the intestinal surfaces; and as a consequence of dysentery and chronic diarrhœa, particularly the dysentery of warm climates; a considerable number of the dissections which Mr. ANNESLEY made in this disease in the East Indies presenting one or more invaginations, commonly in the small intestines. I have also not infrequently found it in fatal cases of inflammation of the brain, or its membranes, in children. Although generally a fatal occurrence, intus-susception is not necessarily such. I believe that it sometimes occurs in infants, without being produced or followed by inflammation; gives rise to symptoms of ileus, or merely to slight colic; and, either with or without the aid of medi-

cine, sometimes is restored to its natural position. In adults, however, even when it occurs without pre-existing inflammation, it almost always causes the most acute inflammatory action, often terminating in the accretion of parts, or in gangrene, chiefly owing to the strangulation of the invaginated part. Many cases, however, terminate fatally before sphacelation takes place; whilst in others, gangrene occurs during life, and the invaginated part passes off by stool; union of the opposing extremities of intestine formed by the separation of the dead invaginated part, and the ultimate recovery of the patient sometimes being the result.

39. One of the most common causes of invagination of the intestines is the inappropriate use of drastic purgatives. In all the cases of invagination observed after death from dysentery, that I have perused, purgatives had been unsparingly and unnecessarily exhibited. M. J. CLOQUET has published a case, wherein a female died of enteritis consequent upon invagination of about fourteen inches of the ileum, occasioned by a polypous excrescence arising from the mucous surface, and which, having been pushed onwards by the peristaltic action of the intestine, had dragged the part to which it was attached along with it. Costiveness is often a prelude to this change, hardened fæces, &c., producing local irritation. Intus-susceptions are most frequently downwards, and but rarely upwards. Dr. MONRO thinks that an inverted action of the bowels is requisite to the production of the latter. They are most common at the termination of the ileum in the caput cæcum. The quantity of intestine that passes within the other varies from one to thirty inches, or even more. In an infant, to the examination of which I accompanied Mr. ALCOCK, nearly the latter extent, including the ileum, cæcum, and ascending colon, was invaginated. In some rare instances, the ileum, cæcum, ascending and transverse colon, passes into the sigmoid flexure, or even as low as the rectum; or the cæcum and colon only (WHATELY, MONRO, &c.). I have met with two or three such cases in infants and children. In rarer instances, a portion of the colon and ileum has passed out at the anus.

40. *Diagnosis.*—Is it possible to distinguish volvulus or ileus owing to intus-susception, from colic or ileus arising from other pathological states? I think that symptoms may present themselves, which will, in some instances, lead the observing practitioner to infer the existence of invagination. The sudden invasion of the symptoms of severe colic or ileus after a violent straining at stool; and, subsequently, the constant desire to go to stool, attempts at evacuation being accompanied with violent tormina and tenesmus, and either unattended by evacuation, or followed by the discharge of a little bloody mucus, and these by symptoms of enteritis; are amongst the most constant concomitants of invagination. In some instances, also, the sudden occurrence of an elongated tumour, in addition to these symptoms, and before abdominal distension comes on, will further guide the opinion; particularly if the invagination be extensive, and seated in the cæcum or course of the colon. Much will, however, depend upon the precision and tact with which an examination of the abdomen is made. In all such cases, the rectum should be examined by

\* A lady, to whom I was called, had inflammation of the uterus, and an abscess formed between the upper part of the vagina and rectum, pressing upon the latter so as to prevent the evacuation of the bowels and injection of gylsters. Colic, followed by ileus, took place. During an attempt to throw up an enema, by passing a male catheter up the rectum, the abscess burst into the rectum, and a large quantity of pure pus, followed by copious fæculent motions, came away, when all the dangerous symptoms disappeared.



the finger; and the extent to which enemata may be thrown up observed as an additional means of information; for whenever the intus-susception is in the colon, as much fluid cannot be thrown up as in health. Hiccup and a small irregular pulse characterise the advanced disease, and indicate the existence of inflammatory action in the invaginated bowel. When a portion of intestine is discharged by stool (as is rarely the case, the patient even recovering and enjoying health afterwards), there can be doubt of the nature of the malady. Dr. MONRO mentions an instance of double intus-susception, or intus-susception of the invaginated part, communicated to him by Mr. A. BURNS. I once met with such an occurrence in a child a few months old.

41. III. OF THE SYMPATHETIC AND COMPLICATED FORMS OF COLIC; OR, COLIC OWING TO MORBID STATES OF ASSOCIATED VISCERA.—Colic, in one or other of the forms already described, but most commonly in its first or simple state (§5. *et seq.*), is not infrequently caused by some other disease. Many of the authors of the last two centuries, and several contemporary Continental writers, have treated of colic when thus originating or associated as essential forms of the complaint. Although obviously only a symptom, or, at most, a part, of an important and often extensive disease, it is not the less deserving of notice when thus associated. It cannot be a matter of surprise, when we consider the relations subsisting between the different abdominal viscera, by means of the ganglial system of nerves distributed to them and influencing their functions, that disease of one of these will often change the sensibility and functions of the alimentary canal, with which it is more or less intimately connected in respect both of organisation and function. As it is useful to be aware of the various morbid associations of colic, I shall notice such as are most commonly met with in practice, with reference to the authorities who have considered them as distinct forms of the disease.

42. A. SENNERT, KINDLER, WALTER, DETHARDING, BONZ, TISSOT, SAUVAGES, and SCHMIDTMANN, have noticed an *inflammatory colic*; which, however, in no respect differs from inflammation of the bowels either in an acute, sub-acute, or chronic form. Colic often rapidly passes into enteritis, and occasionally into dysentery; and, chiefly from this circumstance, together with the more phlogistic nature of the attack, and the abdominal tenderness, CULLEN and GOOD also have distinguished a variety of the disease by the term *inflammatory*. In many cases, also, of chronic, sub-acute, or septic peritonitis, the muscular tunics of the intestines are paralysed, and their canal distended by flatus; the colicky symptoms predominating over and masking the inflammatory action. Hence chronic peritonitis has been often confounded with colic, as I demonstrated in a memoir on that disease published many years ago: but, in such cases, the colic is merely a symptom.

43. B. HOFFMANN and SCHMIDTMANN have distinguished a species of colic by the term *plethorica* or *sanguinea*, comprising under it the varieties arising—*a.* from pregnancy; *b.* from difficult or suppressed menstruation (the *Colica Menstrualis* of various writers); *c.* from suppression of the lochia; *d.* from congestion or

inflammation of the uterus (*C. Uterina*, Auct. var.); and *e.* from hæmorrhoids (*C. Hæmorrhoidalis* of ALBERTI, HOFFMANN, NEZEL, RANOË, and RAVE). That colic is often associated with these affections, or is occasioned by them, there can be no doubt; but it is unnecessary to dignify these varied states of disorder, by arranging them as distinct forms of this disease. It is sufficient to notice them, so as to inform the inexperienced practitioner as to their occasional occurrence, and the importance of attending to the connection in practice; more particularly as they require a modified treatment for their removal.

44. C. Colic also frequently is an attendant upon acute, sub-acute, and chronic diseases of the liver, gall-bladder, and ducts; and, more especially, upon the passage of gall-stones through the common duct. In such cases, the colic is not infrequently associated with jaundice. This connection of the complaint has been fully illustrated by BAILLOU, VOGEL, LIEUTAUD, PROCHASKA, SOEMMERRING, WANDELER, WITTING, CONRADI, &c. and should not be overlooked. (See art. CONCRETIONS—*Biliary*.) In such cases, the fixed pain in the right epigastrium and hypochondrium, extending to the back, and right shoulder-blade or shoulder, in addition to the abdominal colicky pains, vomiting, and costiveness, with or without jaundice, will assist the diagnosis. Some authors have likewise noticed the connection between colic and disease of the pancreas. That the latter will sometimes occasion the former cannot be doubted: but the difficulty of ascertaining the connection during life is great; more particularly as functional disorder of the duodenum, so generally present in almost all cases of colic, is readily mistaken for disease of the pancreas. (See arts. DUODENUM, and PANCREAS.)

45. D. The occasional dependence of colicky affections upon inflammation or other morbid states of the kidney, and upon the irritation of calculi in this organ, its pelvis, or ureter, has been long known. Such complications have occurred to every practitioner, and have been particularly noticed by HORSTIUS, MARTIUS, PISO, FREYTAG, and CRUCHET: they are most frequently met with in gouty and dyspeptic subjects, and persons advanced in life.

46. E. *a.* The frequent and obvious connection of colicky affections with worms, particularly in children and young persons, requires no further remark than that, although the former is merely a symptom of the latter, both obviously originate in debility of the digestive functions. *b.* The occurrence of colic in the gouty and rheumatic diathesis, during the more erratic and irregular forms of these affections, and after the disappearance or retrocession of them from an external part, has been so often observed, that many systematic writers have particularised a *Colica Arthritica* (HOFFMANN, MUSGRAVE, STOLL, BANG, BRANDIS, REICH, SCHMIDTMANN, &c.), and a *C. Rheumatica* (HALLER, STOLL, EYEREL, LENTIN, RANOË, THORN, &c.). *c.* The frequent appearance, also, of this affection in hysterical females, or associated with hysteria, is well known, and chiefly deserving of notice as respects the treatment: the intimate connection of both disorders with morbid sensibility of the organic nerves, and increased mobility of muscular parts



influenced by them, and the not infrequent dependence of them both on congestion of the uterine organs, are too obvious to require illustration. *d.* Flatulent colic is often consequent upon, and complicated with, *asthma* and *bronchorrhæa*; owing to the impeded function of respiration in these diseases, and the discharge of gaseous fluids from the blood by the digestive mucous surface; and, when it occurs in such cases, it aggravates the original complaint. *e.* The only other complication of colic, which may be mentioned, is its occurrence with, or even after the disappearance of, *eruptive complaints*, and in connection with *scorbutic and chronic affections* of the skin. This association has been noticed by HALLER, SIGAUD LA FOND, SCHMIDTMANN, and others; and has been termed by some writers, *Colica Metastatica*. It is probable that, in such cases, a sub-acute or chronic inflammation of some part of the intestines takes place consecutively of the primary affection, the colic being merely a symptom of the inflammatory state. But we should recollect that, in all affections of the skin, the digestive mucous surface is more or less irritated or otherwise affected, and the allied functions disordered; and that an increase of such disorders may both change the state of the cutaneous eruption, and give rise to severe colic.

47. GENERAL REMARKS ON THE PATHOLOGY OF COLIC AND ILEUS.—*A.* The remote causes of colic. Many of these have been particularised when describing the different forms of the disease; a few only require to be enumerated. The more common of these are cold applied to the abdomen, loins, or feet; exposing the back to the strong heat of a fire; acrid, cold, indigestible esculents; cold fluids taken when the body is overheated; solid bodies accidentally or otherwise taken, that admit not of solution or change by the juices in the prima via; irritating or poisonous substances, and the injudicious use of acrid or drastic purgatives, particularly hellebore, scammony, and colocynth: the violent passions and emotions of the mind, as terror, anger, &c. (See § 12. *et cet.*)

48. *B.* Remarks as to diagnosis and prognosis.—An important point connected with the nature of the disease, and one which Dr. ABERCROMBIE appears to have fully made out, is the fact of its sometimes being fatal with no other morbid appearance than great and uniform distension of the bowels. *a.* There can be no doubt that this state will of itself—without any inflammatory action—give rise to tenderness and tension of the abdomen, and thus simulate inflammation, with which, however, it is very often accompanied; and into which sudden distension of the bowels is very apt to terminate. *b.* Although *ileus* is generally the result of obstruction of the canal of the bowels, it is not necessarily so: for in fatal cases of both Madrid and lead colic, as well as in several of *ileus* itself recorded by Dr. ABERCROMBIE and other authors already referred to, no obstruction was found on dissection. The cases recorded by BARTHEZ and MAXWELL also show the propriety of not losing sight of this fact in the treatment of the disease. *c.* Sudden cessation of pain, and sinking of the vital energies, are not necessarily evidence of the accession of gangrene; for they have occurred in fatal cases of colic and *ileus*, where no inflammatory action and no gan-

grene were detected; and, in some few instances, recovery has followed; and, on the other hand, as Dr. ABERCROMBIE has remarked, extensive gangrene has been observed in cases where the pain was violent to the last. These facts confirm an opinion which I had given many years since, that the symptoms often referred to internal gangrene do not prove its accession, but the exhaustion of vital power, and of the sensibility of the organic nervous system; and that a great proportion of the instances of sphacelation found upon dissection did not exist previous to dissolution, but accompanied or followed the fatal issue. *d.* The pulse is often a most fallacious guide in every form of colic and *ileus*: fatal cases sometimes occur, in which the pulse, till within a few hours of dissolution, does not rise above the natural frequency; and in some cases in which there is no inflammatory action, the pulse is frequent throughout. *e.* Although fæculent evacuations are amongst the most favourable indications in the disease, they are not to be implicitly relied upon; for, when the disease is in the small intestines, much fæculent matter may have accumulated in the cæcum and colon, which may be brought away by injections without the affected part being benefited. The subsidence of the more urgent symptoms after the discharge of fæculent motions is the only sure ground of a favourable prognosis. *f.* Though the organic changes I have enumerated (§ 37.), often produce colic or *ileus*, they do not necessarily do so; for gradual exhaustion of the organic functions, and of life itself, without colic, may be the result. They may also exist for a long time without sensibly interrupting the functions of the bowels, until some concurrent or determining cause occurs, and suddenly develops the disease in its worst forms. *g.* The existence of spasm in some part of the intestines, so much insisted upon by writers as the cause of various states of simple, Madrid, and lead colic, as well as of *volvulus*, is evidently of less frequent occurrence than is supposed. Although I would by no means disallow its existence, and cannot admit, with Dr. ABERCROMBIE, that the cord-like constriction of a portion of intestines frequently observed is its natural state, as in the case of the urinary bladder, yet it must be admitted that several symptoms, which have usually been referred to spasm, are actually owing to flatulent dilatation. Spasmodic constriction, however, evidently exists; for, independently of the occasional detection, after death, of a more constricted state of a part of a bowel than can be considered natural, we cannot explain various phenomena connected with colic and *volvulus* without its aid. Besides, its existence is supported by anatomical evidence; for it is a principle in the human economy, that all membranous, and, *à fortiori*, all muscular, canals contract spasmodically or inordinately upon irritation of their internal surfaces. *h.* In lead colic, the last or more dangerous symptoms, whether of the complete form of *ileus* or not, are certainly more unequivocally attended with inordinate distension, particularly of the colon, than with constriction, even although the *sphincter ani* may be at the time spasmodically contracted. *i.* From the foregoing facts, the reader may infer that the diagnosis between colic and inflammation cannot be stated with



precision, as there is no one symptom that can be relied upon,—for inflammation with its consequences may exist, and yet the abdomen may not be painful on pressure. But it is from the manner of their association, and, still more, upon numerous minute circumstances,—some not admitting of satisfactory description, others of only casual occurrence,—and upon the age, employment, constitution, and habits of the patient, as well as from the operation of remedies, that we are to form our inferences both as to the diagnosis, and as to the result.

49. TREATMENT OF THE DIFFERENT SPECIES AND VARIETIES OF COLIC.—I. OF THE COLIC DEPENDING CHIEFLY ON FUNCTIONAL DISORDER. As soon as a practitioner sees a patient in colic, his first object is to ascertain whether or not there be strangulated or incarcerated hernia, or either tension, tumefaction, or retraction, of the abdomen, or circumscribed tumour or hardness in any part of it, or in its immediate vicinity. By the knowledge thus acquired, as well as by the information he may derive as to the cause and history of the complaint, he will be much assisted in devising an appropriate mode of cure.

50. i. *Treatment of the simple forms of colic* (§ 5.).—We have seen that these states of colic chiefly depend upon debility, or deficient vital energy of the alimentary canal, giving rise to altered sensibility of the organic nerves supplying it, to imperfect or irregular action of its muscular coat, and to interrupted or morbid secretion from its mucous surface and associated viscera. These states of disorder are to be removed, 1st, by anodynes combined with stimulants and cordials, which will generally calm the more urgent symptoms; 2d, by purgatives and enemata directed so as to excite the secretions, and evacuate retained excretions; and, 3d, by gentle tonics and cordials, in order to remove debility and promote the digestive actions; all the causes likely to reproduce the disease being carefully avoided.

51. A. Such stimulants as are most antispasmodic, and carminative in their action, judiciously combined with anodynes, and assisted in their operation by frictions of the abdomen with suitable sedative liniments, or by fomentations, may be first employed. Formulæ 178. 187. 211. 377. 835. in the Appendix, or the following, will generally remove the painful symptoms:—

No. 133. R. Aq. Menth. Virid. 3x.; Spirit. Pimentæ (vel Sp. Anisi) 3j.; Tinct. Hyoscyami 3ss.; Confect. Opii gr. x. M. Fiat Haustus statim sumendus. Or,  
No. 134. R. Aq. Pimentæ 3x.; Tinct. Camphor. Comp. 3jss.; Spirit. Myrysticæ, Spir. Carui, aa 3ss.; Confect. Aromat. gr. x. Fiat Haustus statim capiendus, et pro re nata repetendus.

No. 135. R. Camphoræ rasæ 3j.; tere cum Ol. Amygdal. 3ss., et adde Ol. Lini 3j.; Tinct. Opii 3ii.; Ol. Rosmarini 3ss. M. Fiat Linimentum, cum quo illinatur abdomen assidue urgente flatu aut dolore.

If the simple colic evince *nervous* or *hysterical* characters, the preparations of valerian, the spirit. ammon. foetid., &c. may be given or added to the above. If these afford not immediate relief, it will be more judicious to have recourse to laxative, oleaginous, and antispasmodic enemata, than to persist in their exhibition. Any of the formulæ in the Appendix suitable to the circumstances of the case may be directed; or the warm balsams, assafoetida, the terebinthines, the oil or extract of rue, and infusion of valerian, may be employed

in this manner, along with the oleum olivæ, or oleum lini, or any demulcent decoction. When the complaint assumes the *flatulent form*, the warm spices, or their oils, triturated with magnesia or sugar, may be prescribed, or added to the above formulæ.

52. B. Having relieved the more urgent symptoms in this way,—an indication the more requisite in the *spasmodic state* (§ 9.) of simple colic, and often requiring a freer use of the narcotics and antispasmodics than is specified above,—it will be necessary to act upon the bowels by purgatives given by the mouth. In most cases, a full dose of calomel, or of blue pill, is least likely to offend the stomach, whilst it is the most beneficial in its operation upon the suspended secretions: it will be advantageously followed in a few hours by a dose of castor oil, with a few drops of tinct. opii. or tinct. hyoscyami, or by the decoctum aloës comp. with the subcarbonate of soda, the tinct. of hyoscyamus and compound tincture of cardamoms, either of which may be repeated, if necessary, and its operation promoted by the enemata already particularised.

53. C. Having evacuated the bowels, the next object is to restore the energy of the digestive organs, and to promote the abdominal secretions. This may be done by a course of mineral waters, as the Harrogate, the Tunbridge, the Bath, the chalybeate Cheltenham waters, or the artificial waters of Pyrmont, Carlsbad, Ems, &c., and by a judicious combination of gentle tonics with laxatives and the alkaline carbonates, according to the peculiarities of the case; the blue pill, or PLUMMER'S pill, with soap, being also occasionally given at bed-time. SYDENHAM recommended the Peruvian balsam, to restore the digestive functions, and prevent a return of the disorder; and certainly there are few substances better suited for the purpose than it, when judiciously exhibited, or combined with other medicines.

54. If we find the foregoing means fail of affording very marked relief, we should suspect either some degree of latent inflammatory action or a disposition of the complaint to pass into this state; and unfortunately inflammation of the bowels may proceed to a dangerous extent, without either the state of the skin, or of the pulse—without any febrile symptom—indicating its existence. This topic should not be overlooked by the young practitioner. MORGAGNI, RIVERIUS, SIMSON, DE HAEN, BURSERI, SCHMIDTMANN, and ABERCROMBIE, have demonstrated—and my experience has frequently confirmed their observations—not only that enteritis will often assume, during the greater part of its progress, all the symptoms of simple colic, but that the complaint may run its course, until the sudden cessation of the painful symptoms, without any evident cause, furnishes the first evidence both of pre-existing inflammation and of incipient gangrene. On this and other accounts, therefore, we should endeavour, in all the states of this variety of colic, to ascertain the existence or non-existence of inflammatory action, or even vascular erithism in some part of the alimentary canal. If this disorder exist, the tongue will generally be red at its point or sides, and furred or loaded in the middle; the urine will be small in quantity, or high coloured; cardialgia will sometimes be complained of; and if tenderness on pressure be felt,



it will either be independent of any marked distension of the abdomen, or it will be attended with tension and fulness, anxiety, a dark or dusky appearance about the eyes and mouth, and with thirst. Under these circumstances especially, and in the more severe attacks, particularly in the spasmodic, occurring in persons previously in health, *blood-letting* should not be omitted; and even in doubtful cases, blood may be taken either from the arm, or from the abdomen by cupping or leeches, followed by fomentations and poultices,—if there be tumefaction, by the warm turpentine fomentation and injection. Heating carminatives and antispasmodics will be injurious in all such cases, whether vomiting be present or not; and too active endeavours to procure alvine evacuations by means of purgatives given by the mouth may increase the disorder. I have derived more advantage in these cases from small and repeated doses of the sub-carbonate of soda, or the sub-borate of soda, with nitre, in camphor mixture or some aromatic water—from the use of enemata and gentle frictions of the surface of the abdomen with a rubefacient liniment (F. 311.313.)—than from purgatives. In a few cases I have given the hydrocyanic acid, either in full doses of the oleum ricini, or in the oleum amygdal. dulcis. When judiciously prescribed, this powerful sedative has a most beneficial effect in restoring the digestive functions after the attack is removed. The hydrargyrum cum creta, or the blue pill, with taraxacum, hyoscyamus, or extract of hop, may also be given after the action of the bowels is restored.

55. ii. *Treatment of colic from injurious ingesta, &c.* (§ 10.)—*a.* The state of disorder proceeding from cold acid beverages will generally be soon removed by antacids, combined with narcotics, as ammonia, soda, magnesia, &c. given with opium, or hyoscyamus, and with cordials or carminatives (F. 179.347, 348.); enemata and frictions of the abdomen, as already recommended (§ 51.) may be also employed, according to the circumstances of the case. *b.* When the affection is occasioned by cold, acerb, or indigestible fruit or food, it will generally be necessary to commence the treatment by an active warm emetic; and afterwards cordials, cardiacs, and enemata (§ 51, 52.), may be prescribed. *c.* If the complaint be produced by fish, Cayenne pepper is an almost unfailing antidote. *d.* If it be occasioned by smoked or tainted meat, or other esculents that have disagreed with the digestive organs, emetics, and afterwards cordials, warm aromatics, and stimulating clysters, with frictions of the abdomen, are among the most successful means. *e.* Colic sometimes is a consequence of indigestion, and of acidity or sordes in the digestive tube, often occasioned by too much or indigestible food; it then requires a combination of antacids with aperients or purgatives, as the compound decoction of aloes, or the compound infusions of gentian and senna, with soda and ammonia. After the urgent symptoms are removed, the digestive functions should be strengthened and promoted by gentle tonics and deobstruent laxatives (F. 214.218.362.872.). RICHTER recommends for this purpose equal parts of assafoetida and the *fel tauri inspissatum*, especially in the form of the complaint proceeding from acidity.

56. The *colic of infants* has been stated to

proceed chiefly from acidity of the *prima via* occasioned by the quality or quantity of the ingesta (§ 15.). The sub-carbonates of the alkalies, magnesia, and the preparations of chalk or lime, with carminatives and cordials, are therefore required. (See F. 616. 633.) A combination of magnesia with the oxide of zinc is prescribed by RICHTER. Magnesia, soda, or ammonia, in the aqua foeniculi dulcis or aq. anisi, and afterwards a dose of fresh castor oil; the semicupium, and, if it be requisite, an emollient or oleaginous enema, to which a little extractum rutæ, olei anisi, or tincture of assafoetida, has been added, will generally remove all disorder. If, however, these do not soon give relief, the enema should be repeated, and the abdomen rubbed with an antispasmodic liniment (§ 51, R. 135.). If the complaint occur about the period of dentition, the gums ought to be examined, and scarified, if any fulness or redness be remarked in them. If these means fail, those recommended in the section on *volvulus* (§ 77. *et seq.*) must be put in practice.

57. iii. *Treatment of colic from morbid secretion, &c.*—*A.* The *colic occurring in new-born infants*, from retention of the meconium, is generally soon removed by a dose of castor oil; and, if it fail, by an oleaginous clyster, or by one containing a tea-spoonful of honey and another of common salt, assisted by the semicupium, and the means stated above (§ 56.). *B.* Colic from *accumulation of faecal matters* (§ 19.), or from constipation of the bowels, obviously requires purgatives and oleaginous or saponaceous injections. STOLL prescribed emetics in this form of the complaint, and was followed in the practice by SIMS and HOSACK; RIVIERUS gave rhubarb and the turpentine; and BAGLIVI and SYDENHAM advised cathartics and anodynes in oleaginous emulsions. The preparations of sulphur, in doses sufficient to act on the bowels, have been praised by AGRICOLA and RAVE; and frictions and bandages of the abdomen have been recommended by many eminent writers. In this form of the disease, more advantage will be obtained from the repeated exhibition of medicines of a simply relaxing operation (see F. 82. 96. 430.), assisted by large oleaginous and saponaceous injections in the manner recommended by Dr. MAXWELL (see § 77.), than by cathartics, which may irritate or inflame the upper parts of the digestive canal, before they can reach or affect the parts where obstruction exists. Spirits of turpentine, with olive or castor oil, when perfectly diffused and suspended in a suitable vehicle, are extremely efficacious in this state of disorder. An ounce of the spirits, with two or three of either of these oils, in about sixteen or twenty-four ounces of a mucilaginous decoction, should be slowly but steadily thrown up by means of the enema apparatus, the pipe of which may be provided with a guard, to prevent the regurgitation of the fluid. In order to facilitate the passage of this enema along the colon, the patient may be placed in bed, with the pelvis considerably elevated, and friction of the abdomen may be employed during and after the injection of it. If there be no nausea, the following may be taken, and repeated in six or eight hours, if it be requisite:—

No. 136. R. Potassæ Supertart. in pulv. ʒjss.—3ij.;



Magnes. Calcinat. 3 ss. ; Confect. Sennæ et Syrup. Zingiberis aa 3 ij. ; Olei Anisi M ij. M. Fiat Electuarium.

If nausea be complained of, a full dose of calomel only may be exhibited; and, after a few hours, the above electuary given, and the injection repeated; or the treatment recommended in the article CONSTIPATION may be adopted. If tenderness and tension of the abdomen, with hard, constricted, oppressed, or quick pulse, be present, inflammation should be suspected, particularly if vomiting also exist. In this case blood-letting must be practised, and the disease treated in all respects as stated in the articles on *Inflammation of the Intestines and Peritoneum*.

58. *C. The West Indian and Madrid colics* (§ 20.).—*a.* Dr. MUSGRAVE, whose experience of *West India colic* has been extensive, recommends ten or fifteen grains of calomel to be exhibited immediately, and afterwards five grains combined with a cathartic. He likewise advises a dose of a purgative mixture to be given in the intervals, if the stomach will retain it. The intentions this physician proposes are to evacuate the bowels, and to affect the system with mercury. As soon as the mouth becomes affected, the calomel should be omitted, and alvine discharges promoted. When the spasmodic action of the bowels is severe, and signs of vascular excitement appear, blood-letting ought to be practised; this evacuation tending both to relax the bowels, and to promote the absorption of the calomel. In addition to these means, the warm bath, and terebinthinate enemata, should be employed.

59. *b. The Madrid colic* (§ 20.).—M. MARQUAND states that an emetic given at the very commencement of the attack is sometimes of use, by evacuating retained bile; but that it may be prejudicial, particularly if exhibited in an advanced period of the complaint. He recommends, as the safest and most successful practice, 1st, to calm existing irritation by opiates; and, 2d, to restore alvine evacuations. He prescribes a grain of opium every three hours till relief is obtained, which is usually the case after the third or fourth dose. He afterwards exhibits purgatives, and promotes their operation by glysters, which generally bring away copious blackish and offensive stools. The Spanish physicians have commonly recourse to the oleum ricini as a purgative in this complaint, but M. MARQUAND prefers scammony and jalap, as being, in his judgment, more certain and quick in their operation. This treatment is the same as that long since recommended by Mr. QUIER, in the dry belly-ache of the West Indies.

60. *iv. Treatment of lead colic* (§ 25.).—In this variety of the complaint, as well as in those forms which have received the denomination of Madrid, West Indian, or hepatic colic, the hepatic ducts and gall-bladder are obviously obstructed or loaded by morbid bile; the irritation caused by which most probably occasions spasm of the common duct, duodenum, and parts in the vicinity, in the early stages of the disease. Very different, and even opposite, modes of treatment have been recommended in lead colic. *a.* Blood-letting has been directed by CALMETTE, ASTRUC, CHRISTISON, and GREGORY; whilst other writers, as DUBOIS and DUFRESNE, have considered it either unnecessary or injurious. I have prescribed it in some cases with manifest ad-

vantage, the state of vascular action evidently indicating the propriety of resorting to it; but, in others that I have seen, it obviously would have been injurious. When the face is flushed, the skin hot, and the pulse full or accelerated, it is both safe and requisite. *b.* The use of opium has the support of the ablest writers on the disease — of GRASHUIS, RIEDLIN, STOLL, SCHLEGEL, REYNOLDS, BAKER, ADAIR, EYEREL, WARREN, WOLFF, DE HAEN, and GENDRON; but they are not agreed as to the period of exhibiting it. Sir G. BAKER commenced with purgatives, whilst DE HAEN, DARWIN, WARREN, and BATEMAN began with opium, and gave purgatives afterwards. Dr. PEMBERTON advised a combination of both — of laudanum with castor oil. It appears to me preferable to combine the first dose or two of opium with calomel, as recommended by BURGER, particularly if the functions of the liver be obviously affected, as they often are, and if the stomach be irritable, as it generally is in the advanced state of the disease. But the dose of calomel should be large (from 10 to 20 grains), and not repeated oftener than once or twice. This combination will frequently of itself open the bowels; but whether it does so or not, purgatives ought to be exhibited, and their operation promoted.

61. *c.* As to the propriety of having recourse to this class of medicines, there is no difference of opinion, however much sentiments may vary as to the choice which should be made of them. GRASHIUS, MOSELY, FISCHER, FRIESE, and ODIER prefer the oleum ricini. BURGER advises it to be given with manna; EYEREL, after blood-letting, with emollients and opium; and TISSOT in clysters. Several writers prefer the combination of antispasmodics and sedatives with purgatives, on the supposition that the obstruction of the bowels attendant on the disease arises from spasm in some part of them. But, as Dr. CHEYNE and Dr. ABERCROMBIE have justly contended, it is quite as much owing to distension, from a paralytic state of the muscular coat, that the obstruction occurs, as to spasmodic constriction. According to this view, little benefit can result, as respects the operation of cathartics, from combining them with antispasmodic anodynes, unless with such as may stimulate the intestinal canal; and, in fact, such seems to be the result of observation. Some writers, conceiving that lead colic may arise from the presence of the acetate or the oxide of lead in the prima via, have recommended the sulphate of magnesia with the view of forming an insoluble sulphate of lead. The experiments and views of ORFILA, GOOD, and Dr. PARIS, seem to favour the employment of this sulphate as well as the sulphate of alumina, exhibited with an excess of acid, or in the compound infusion of roses; and certainly unequivocal benefit results from the practice. But whether that benefit arises from reducing the lead to an insoluble salt, or from the operation of the sulphates in exciting the action of the partially paralysed muscular coat of the bowels, and thereby enabling them to expel retained matters of a morbid or noxious description, cannot readily be determined. We have no evidence of the existence of lead in the prima via to an extent that admits of detection, nor has the formation of a sulphate of lead been demonstrated. I am



therefore inclined to adopt the other mode of explaining the operation of these salts. I have found the *croton oil* an excellent purgative in this disease, particularly when it is added to either *castor oil* or the oil of *turpentine*, or to both. I have in one or two cases caused the croton oil to be rubbed over the abdomen in this species of colic, with the hopes that it might act upon the bowels; but I did not obtain this effect. The quick irritation of the skin, however, that it produced, evidently proved salutary. *Sulphur* and its preparations, as well as sulphureous waters, have been prescribed by LUZURIAGA in the Madrid colic, in which they are obviously beneficial; and subsequent writers, particularly GARNETT and HAHNEMANN, proceeding on the erroneous opinion that the Madrid colic is identical with lead colic, have recommended them also in the latter: but, as ORFILA has expressly stated, they are most dangerous remedies in true lead colic. A case demonstrative of this fact occurred in my practice many years ago, and was published in the *London Medical Repository* for October 1822. The deleterious effects are there ascribed to the absorption of sulphur, which was taken by the patient, contrary to my advice, in order to counteract the habitually costive state of his bowels.

62. *d.* The *sulphate of alumina* has been given by some modern physicians, with the view already stated (§ 61.); but with many its exhibition has been altogether empirical. GRASHUIS, QUARIN, ADAIR, FISCHER, SCHLEGEL, LINDT, PERCIVAL, MICHAELIS, GEBEL, and SOMMER favour the use of it, either alone or with mucilaginous and narcotic medicines. I believe that its efficacy is much enhanced by giving it with camphor, opium, and demulcents. SCHMIDTMANN details a case, in which the exhibition of two or three doses of alum produced a most copious operation on the bowels, after the most active purgatives had been given by the mouth and *per anum* without any effect. When residing on the Continent in 1818 and 1819, I saw many cases treated by this substance, given in doses of from a scruple to two drachms in gum-water, or with camphor and opium. M. KAPELER, in his hospital, into which many cases of the disease are admitted, employed scarcely any other medicine than alum dissolved in mucilaginous decoctions, assisting its action by oleaginous clysters. The worst cases,—those with paralysis, loss of sight and hearing, violent cephalalgia, tremors of the muscles and limbs, &c. were restored in a much shorter time by this than by any other treatment, and with much less disposition to relapse, or to pass into a paralytic state. I have employed alum with uniform success in several cases, and combined it with camphor, Cayenne pepper, and occasionally with opium; and have always found that, when given in sufficient quantity,—from two to four or five drachms in the twenty-four hours, and assisted by oleaginous clysters,—it will open the bowels more certainly than any other medicine. M. GENDRIN has recently given alum in fifty-eight cases of this disease, all of which recovered in from three to five days. He has also found that a drachm, or a drachm and a half, of *sulphuric acid* in the twenty-four hours, taken in three or four pints of water, is equally prompt and

efficacious. The *sulphate of zinc* was recommended by Dr. MOSELY, seemingly from considering its operation analogous to that of alum; and the sulphate of copper was mentioned by HARRISON.

63. *e.* *Mercury* has been very generally prescribed in this complaint, particularly by CLARK, HUNTER, WARREN, BISS, BURGER, CLUTTERBUCK, and others; but with very different views. Some have given it simply as a chologogue purgative; and others with the intention of preventing the accession of paralytic symptoms; although it is by no means obvious how it can have this latter effect, since these symptoms seldom originate in structural change in any part of the cerebro-spinal axis, when they occur during or after lead colic. Those who have prescribed the preparations of mercury with this latter view, as CLARK, WARREN, and BISS, have pushed it to the production of salivation; but, although I admit that salivation will speedily alleviate the abdominal symptoms, yet I am of opinion that it will rather favour than prevent the accession of paralysis, the more especially as I have observed this affection to follow, notwithstanding the salivation which had been produced with the hopes of preventing it.

64. *f.* Besides the foregoing means, various others have been recommended by writers on the disease. Dr. ROBERTS has detailed two cases in which the *nitrate of silver* was internally exhibited with apparent benefit. *Tobacco* in various forms has also been prescribed. BARTHOLINUS was the first to employ this plant in the treatment of colic, by directing its smoke to be thrown up the rectum—one of the safest and most beneficial modes of using tobacco internally. Dr. GRAVES has derived much benefit from compresses, moistened with a strong decoction of it, applied over the abdomen; and from croton oil internally, assisted by clysters. *Emetics* have been recommended by some writers; but they are required only after lead has been taken in poisonous doses, or at the commencement of the attack, when the biliary organs are loaded by vitiated bile. They, however, form a principal part of the treatment usually adopted in the Parisian hospitals. *Cold and warm baths* have both been mentioned by writers as being sometimes of service; but I consider the former attended by some risk, and the latter seldom required, although occasionally palliating the more painful symptoms. The propriety of having recourse to *external irritation* in this disease has been admitted by many of the writers already referred to, and *blisters* and various other means of a similar kind have been adopted. In several cases I have, however, found more advantage from one of the liniments above recommended; or, if an irritating effect was desired in a short time, I have obtained it from either increasing the more irritating ingredients contained in these liniments, or applying a cloth moistened with one of them closely to the abdomen. The *hot turpentine fomentation*, or a few drops of croton oil rubbed on the surface of the belly, will have a similar effect; but the former of these, accompanied with suitable internal medicine, is the most rapidly efficacious.

65. *g.* The great number of cases of this disease admitted into the hospitals "*La Charité*" at Paris, and "*Hotel Dieu*" at Orleans, naturally



attracts attention to the plans of cure which are there adopted; but at neither of them is the treatment so simple or so quickly beneficial as that adopted by M. KAPELER, and already stated. At La Charité the treatment consists chiefly of emetics, purgatives, sudorifics, and opiates; and at several of the French hospitals large local depletions are also employed. But the whole plan of cure is generally complex and distressing to the patient. M. RANQUE, of the "Hôtel-Dieu" at Orleans, states, that of about 150 cases he treated, he did not lose one. He commences with the semicupium; and afterwards applies on the abdomen and loins a large plaster, consisting chiefly of diachylon, conium plaster, camphor, and tartarised antimony. This is allowed to remain until pustules come out, and the pained parts are rubbed with a liniment, the active ingredient in which is the extract of belladonna dissolved in sulphuric ether. He next administers, once or twice daily, an enema with four ounces of olive or almond oil, and twenty drops of the ætherial tincture of belladonna in the linseed decoction; and prescribes, when the sufferings are severe, small doses of the same tincture to be taken at the same time in a demulcent mixture. This treatment is persisted in for three or four days; and if considerable relief has not been obtained at the end of this time, castor oil is given in small and repeated doses, the anodyne liniment is assiduously employed, and the plaster on the loins and abdomen is renewed, with an increased quantity of camphor and tartarised anatomy. Although this plan of cure appears to be very successful, yet relapses are very frequent after it.

66. *h.* The treatment adopted by the Author in lead colic is directed with the views, 1st, of relieving the sufferings of the patient; 2d, of evacuating the retained secretions, which are always remarkably morbid, and apparently the cause of the phenomena constituting the fully developed disease; and, 3d, of imparting energy to the weakened nerves, and parts that they supply. In fulfilling these intentions, the practitioner is often placed in a practical dilemma, from the circumstance of the medicine, which is most to be depended upon in relieving some of the most urgent symptoms, and enabling the liver to throw off the load of morbid secretions which oppress it, having the effect, in some constitutions especially, of increasing the exhaustion of nervous power, and the tremors and paralysis attendant on the worst forms of the complaint. *Calomel*, in a large dose, either alone or with *opium*, has an excellent effect in allaying the distressing irritability of stomach, and carrying the biliary and other morbid secretions downwards: but if it be repeated in such quantity oftener than once, or if free evacuations be not procured soon after its administration, it is apt to affect the mouth, and to prolong the period of convalescence. I have, therefore, endeavoured to procure from it a soothing effect on the stomach, along with its chologogue operation, guarding against its secondary action on the system; and have prescribed from ten to twenty grains in a bolus, with about ten grains of *camphor*, and sometimes with two of *opium*. This will generally allay the retchings, and enable the stomach to retain the medicine next to be given.

About three or four hours after the above has been taken, a draught, consisting of half an ounce each of *castor oil* and *oil of turpentine*, with one or two drops of *croton oil*, on the surface of aqua pimentæ, is administered, and its operation on the bowels promoted by a clyster composed of about four ounces of *olive oil*, or two of castor oil, one of turpentine, half an ounce of *sulphate of magnesia*, and from ten to twenty ounces of the decoction of linseed, or of marshmallows. This enema should be steadily thrown up by the improved apparatus. Whilst this treatment is proceeding, a *liniment* may be assiduously rubbed on the abdomen, and on the limbs, if much pain be felt in them; or a piece of flannel charged with one of these liniments (F. 297. 307., &c.) may be closely applied over the belly. If these means procure evacuations, recovery will soon follow; but if the draught be thrown off the stomach, or the injection be returned without effect, they should nevertheless be repeated. If the abdomen be much distended, and painful on pressure, the hot turpentine fomentation ought to be applied, as long as the patient can endure it, instead of the liniment. These measures will seldom fail of procuring most copious evacuations, which should be promoted by *sulphate of magnesia*, and *spiritus æther. sulph. comp.* in the compound infusion of roses; and by oleaginous clysters with camphor or assafœtida, and oil of linseed. After two or three doses of *sulphate of magnesia* have been given, the following draught may be exhibited, and repeated frequently; the action of the bowels being promoted by the enema.

No. 137. R. Camphoræ rasæ gr. iij.—vj.; tere cum Mucilag. Acaciæ 3 ss., et Aq. Pimentæ 3 j.; Sulph. Alumin. pulver. 3 ss.; Spirit. Anisi 3 j.; Syrup. Croci 3 ss. Misce. Fiat Haustus, quartâ vel quintâ quâque horâ sumendus, prius agitata phiala.

No. 138. R. Terebinth. Venet. vel Commun. 3 vj.—3 j.; Tinct. Assafœtidæ 3 ss. (vel Ol. Anisi 3 j.); Olei Olivæ 3 iij.; tere cum Vitel. Ovi, et adde Decocti Malvæ 3 xvj., in quo prius soluta erat Sulphatis Magnesiae 3 ss.—3 j., et fiat Enema.

67. *i.* The treatment of convalescence from lead colic is of much importance, particularly when attended with tremors, epilepsy, severe cephalalgia, or paralysis. At first the *alum* and *camphor* should be given for two or three days; and the action of the bowels promoted by oleaginous enemata; the loins and abdomen being rubbed, night and morning, with one of the liniments already recommended. As there is a great tendency of the disease to return, particularly when the patient follows the occupation which occasioned it, the strictest attention should always be paid to the state of the bowels, and the sulphates of magnesia and alumina, with compound infusion of roses, and some aromatic spirit, be taken frequently; and, upon the first indication of obstruction, recourse should be had to oleaginous clysters.

68. *k.* In order to remove the sequelæ of the disease, particularly the *paralysis*, the patient should be allowed a generous diet, with exercise in the open air; and *strychnine*, or the extract of *nuxvomica*, with the aloes and myrrh pill, or F. 541. 565. may be taken twice or thrice daily. The palsy arising from the poison of lead is much benefited by this active medicine, as well as by frictions with stimulating substances, by electricity, and the use of splints along the fore-arm and hand, as recommended by Dr. PEMBERTON. The Bath waters are very serviceable in promoting perfect



recovery, and preventing a relapse: with these views, the balsams, particularly the Canadian and Peruvian, may also be taken, with the sulphates of alumina and quinine, or with tonic extracts, camphor, &c.; and, under every circumstance, the digestive organs should be strengthened and the action of the bowels promoted by tonics combined with aperients and antispasmodics. I have obtained marked advantage from strychnine thus combined, as well as from several of the gum resins, as ammoniacum, myrrh, assafoetida, and galbanum, particularly when, besides the reduced nervous and muscular power, the digestive functions still continued to suffer. (For the *prophylactic treatment* of this disease, see the article *ARTS AND EMPLOYMENTS*, § 17—30.)

69. II. TREATMENT OF COLIC CAUSED CHIEFLY BY CHANGE OF STRUCTURE OR POSITION.—i. *Of colic from constriction of the bowels.* This state of disease will not be benefited by purgatives or carminatives; but a judicious choice and combination of aperients will often be of service. In all cases of this description, due examination *per anum* should be instituted; and as stricture frequently occurs at the upper part of the rectum and lower part of the sigmoid flexure of the colon, a very long flexible bougie should be carefully introduced, as recommended by Dr. WILLAN. When we have reason to suspect the existence of stricture in any part of the colon, the use of mucilaginous, saponaceous, or oleaginous enemata should be long persisted in; but the patient ought to be very careful not to employ any oil that is not perfectly sweet. At the same time, the action of the bowels may be promoted by an electuary composed of equal parts of the supertartrate of potash and sub-borate of soda, with confection of senna and common treacle, or either the inspissated juice of the sambucus, or simple syrup. I have seen advantage derived from a plaster, consisting of the emplastrum picis comp., the emplastr. ammoniaci cum hydrargyro, and either the extract. belladonnæ or the extr. conii, kept long applied over the abdomen. When the stricture appears to be low in the colon, and yet beyond the reach of a bougie, *suppositories*, with either of these extracts and the lead plaster, will be productive of some relief; and when it can be reached by a bougie, the occasional introduction of one will often permanently remedy the disease.

70. Most of the cases of this complaint that I have seen, have occurred in persons who had long been in the habit of having recourse to purgatives, consisting chiefly of calomel and colocynth, or the compound extract of the latter—substances which have a remarkable effect in irritating the internal surface of the colon and rectum, and constricting their muscular tunics. It is obvious that a frequent repetition of these medicines, unless their effects be counteracted by emollient clysters, will at last give rise to inflammatory thickening of the parietes of the bowel, and constriction of its canal. In most of these cases, also, there exists inflammatory action of the internal surface of the constricted part, and of its vicinity. Hence the advantage usually derived from a cooling regimen, a spare or farinaceous diet, and cooling gentle laxatives, assisted by soothing and demulcent clysters, as the following:—

No. 139. R. Semin. Fœnicul. dulc., Semin. Anisi, āā

contus. ʒss.; Fol. Malvæ et Flor. Anthem. āā ʒvj.; Aquæ Ojss. Coque ad Oj.; dein exprime, et adde liq. expresso Olei Olivæ, vel Ol. Lini, ʒiij.; Potassæ Tartar. et Sub-boratis Sodæ āā ʒj.—ʒij. Misce et fiat Enema, pro re nata injiciendum.

No. 140. R. Extr. Hyoscyami ʒij.; Camphoræ rasæ gr.vj.—x.; Sodæ Sub-carbon. vel Sub-boratis ʒjss.—3 ijss.; Potassæ Nitratis ʒss.; tere cum Mucilag. Acaciæ ʒvj., et adde Decoct. Papaveris ʒx.—xx. Misce et fiat Enema.

No. 141. R. Extr. Belladonnæ gr. iij.—vj.; tere cum Decoct. Cydoniæ (vel Decoct. Althææ, vel Dec. Hordei Comp.) ʒxij.—xvj.; et adde Potassæ Sub-carbon. ʒj.; Potassæ Nitratis ʒj. Misce pro Enemate.

71. ii. *Treatment of Ileus.*—The importance of ascertaining, previously to the adoption of a plan of treatment in this state of the disease, the existence of hernia, has been already noticed; but the young practitioner should be aware that hernia may exist without the patient being aware of it; and the real state of the case may be mistaken, owing to the absence of any tumour, so very small a portion of the side of the bowel being strangulated as not even to obstruct its canal. I have twice or thrice—once in one of my servants—met with such cases, in consultation with eminent surgeons, where the exact state of parts was inferred, and a successful treatment pursued. There are certain forms of the disease which may be briefly characterised, as they require a very different treatment:—1st, Great distension of the abdomen, with diffuse, but not acute tenderness; obstinate costiveness; retchings, particularly when substances are taken into the stomach; anxiety, and general uneasiness: 2d, The above symptoms, with fixed and severe pain, and great tenderness, felt in a defined part of the abdomen, often about the region of the cæcum: 3d, Violent attacks of tormina, occurring in paroxysms, like the strong impulse downwards from the action of a drastic purge,—the action proceeding to a certain point—there stopping, and becoming inverted,—followed by vomiting, which soon becomes feculent (ABERCROMBIE): and, 4th, Where the symptoms of the third state are accompanied with tenesmus, and the discharge of a small quantity of bloody water or mucus, sometimes with indistinct or elongated tumour, and the other signs already described (§ 40.) as indicating invagination of the bowels.

72. In the *first* of these the bowels are evidently distended and inactive;—in the *second*, they are probably in a similar state, owing to obstruction, stricture, or strangulation, with inflammation, most frequently in the vicinity of the cæcum and its appendix;—in the *third*, there are more evident signs of stricture or strangulation; but this may also be an advanced stage of the second;—and in the *fourth*, the symptoms are more strictly referrible to invagination; although this may also exist in the third of these states.

73. A. It is evident that the *first* of these states will very frequently be much benefited by *purgatives*, particularly by a large dose of calomel (from 10 to 20 grains), which will, either alone or with camphor and hyoscyamus, allay the morbid action of the stomach, and move the bowels, particularly if it be assisted by the hot turpentine fomentation or epithem (§ 54.), and by enemata (§ 57. 66. 70.). In cases where a full dose of calomel only has been given, a dose of castor oil, with ten or fifteen drops of laudanum, may follow it in one or two hours; and an injection with three times the quantity of the same medicines may afterwards be thrown up. In some instances



equal quantities of castor oil and turpentine may be given soon after the calomel. After the irritability of the stomach has subsided, the action of the bowels may be promoted by small doses, frequently repeated, of the purified *extract of aloes*, with hyoscyamus, and a small quantity of extract of gentian, which will promote its action. GALLESKY states that he has found recently expressed *linseed oil*, in the dose of a large spoonful, with a few drops of the oil of aniseed, given every hour or two hours, extremely beneficial. If the first dose of calomel neither opens the bowels nor allays the action of the stomach, it may be combined with from one and a half to three grains of pure opium. This will, in most instances, settle the stomach and open the bowels, particularly if it be soon followed by the fomentation and enema already advised.

74. *B.* The tendency of colic to lapse into a latent or obscure state of inflammation has already been noticed (§ 54.); and this tendency is the greater, the more nearly the disease approaches to ileus from its commencement. As colic in every form is more especially an affection of the muscular coats of the bowel, and as inflammation, when it supervenes, as it so frequently does, upon colic, seems to attack this part especially, and to terminate then more rapidly in gangrene than when it originates in either the mucous or peritoneal coats, so it becomes necessary to have a prompt recourse to *blood-letting*, particularly when rigors have occurred, and the pulse is oppressed or constricted, and the habit of body plethoric or muscular. In such cases, blood-letting should be full and decided, and, if necessary repeated; but it ought not to be trusted to alone, or even mainly; for if carried too far, or employed too largely, or even at all in some cases and states of constitution, or too late in the disease, it may hasten a fatal termination. It is beneficial chiefly in the *second* and *third* states of the malady, especially when resorted to early, and followed by local depletion, by calomel and opium, the warm turpentine fomentation on the abdomen, and subsequently by clysters (F. 144. 146, 147.). I believe, however, that in many cases, particularly those commencing as flatulent colic, blood-letting carried to the utmost extent will not of itself prevent either gangrene from taking place, or fæculent vomiting from coming on. For in these, and in the *first* state above specified, the muscular and other coats seem to lose their vitality, without almost any other mark of pre-existing inflammation, that I could observe in some cases on dissection, than change of colour. And yet, when duly employed, particularly early in the other states of the disease, blood-letting will often give decided and immediate relief, and be quickly followed by free evacuations and speedy recovery.

75. *C.* *Opiates* and other *anodynes* are most important remedies in nearly all the states of the disease, but especially in the *second* and *third* particularised. The propriety of premising general or local blood-letting, or both, when it is clearly indicated, and the advantages of combining opium or hyoscyamus, at first with a large dose of calomel, or camphor, or both, have been adverted to. These remedies will often of themselves produce free evacuations; but in the states of ileus now mentioned, *purgatives* given by the mouth, unless of the mildest kind, or combined

as above (§ 52.), and exhibited subsequently to the above remedies, are seldom of service. Appropriate enemata, however, should not be omitted.

76. *D.* The *tobacco injection* is one of the most generally adopted remedies in this disease, and one which has received the warm sanction of Dr. ABERCROMBIE. This able physician recommends it with judicious caution, and directs at first only fifteen grains of the tobacco to be infused for ten minutes in six ounces of boiling water; the quantity to be increased to twenty grains, and repeated after an hour, if no effect be produced. I believe that, when thus employed, early in the disease, and in persons previously of sound vital power, this will often be of service, or at least not detrimental. But I have seen several cases wherein this powerful substance, even when no more than half a drachm had been infused for fifteen minutes in a pint of water, produced the most distressing effects; and in one case, where it was given in opposition to my opinion, which was in favour of a terebinthinate injection, death followed its administration before three minutes had expired, — evidently from its sedative operation in an advanced state of disease. I have seen many cases in which it had been administered, and, unless under the circumstances in which I have stated it to be admissible, or when stimuli are given at the same time by the mouth, I believe that it favours a fatal termination, by exhausting the vital power of the alimentary canal, and disposing inflammatory action to terminate in gangrene. The introduction of *tobacco smoke* into the large bowels appears a much safer and more efficacious practice, and to be appropriate to a greater number of the many morbid states of which ileus is an effect.

77. *E.* Various *other kinds of injection* have been recommended; and some of them are more deserving of confidence in the treatment of ileus than almost any other remedy. I have already mentioned several (§ 66. 70.), and referred to others in the Appendix (F. 140, 141. 150.), on which very considerable reliance may be placed. Dr. MAXWELL has found large injections of *warm linseed oil* — from two to four pints — steadily and slowly thrown up, regurgitation being prevented by pressing the guard of the pipe against the anus, remarkably successful, after fæculent vomiting had come on, and the usual means had failed. He recommends, in such cases, the patient to be placed on the right side, with the pelvis elevated above the rest of the body, the premature return of the injection being prevented by firmly pressing a ball of linen against the anus. He directs this clyster to be repeated every three or four hours, until relief is obtained; and, when much exhaustion is present, with the addition of laudanum. This physician likewise advises, in cases where the existence of intus-susception is suspected, the *inflation of the intestines by air*, and adduces cases in which it was followed by copious evacuations; but it seems doubtful whether or not invagination existed in any of them. This practice, first recommended by HIPPOCRATES, afterwards insisted on by ALEXANDER of TRALLES, ZACUTUS LUSITANUS, and RIVERIUS, and mentioned by SAGAR, and some other systematic writers, is certainly deserving of trial where we have reason to suspect invagination or internal strangulation.



In most cases, however, inflation with *tobacco smoke* appears preferable; but, as QUARIN remarks, it should be frequently repeated, and its effects carefully watched. Although the infusion of tobacco has been chosen for injection by VICAT, FOWLER, CAMPET, CONRADI, HUFELAND, and ABERCROMBIE, yet I agree with SYDENHAM, DE HAEN, SAGAR, QUARIN, and many others, in considering the smoke superior to the infusion; the former being adopted by some merely on account of the greater facility of conveying it into the bowels, and without reference to the very different operation of these two modes of employing this powerful medicine. But in cases where inflation by air or tobacco smoke is adopted, purgative injections should speedily follow, as directed by HIPPOCRATES, if evacuations have not taken place; for the smoke may even pass out by the mouth, and yet copious motions may not otherwise be procured. Besides these means, *yeast* has been administered as an injection in warm small beer, with the intention of evolving its fixed air in the bowels, and thereby extricating any unnatural convulsion or slight invagination that may have been formed. *Sulphuric æther* has likewise been thrown into the large bowels, with the expectation that its fumes would operate in a similar manner. *Antimonial wine*, and the *powder* or *infusion* of *ipécacuanha* have been prescribed in enemata, with the view of relaxing spasm, in cases where it is presumed to be the chief cause of obstruction; whilst the infusion of poppies and of chamomile flowers, various anodyne, saponaceous, laxative, and oleaginous injections (§57.66.), have also been directed with the views already stated.

78. *F. Baths, &c.*—*Tepid* or *warm baths* are sometimes useful adjuvants in the early stages of the disease, and are generally recommended. *Cold fluids* taken into the stomach, and thrown into the large bowels, in considerable quantities, and *cold epithems* constantly applied on the abdomen, have been prescribed by BUREAU\*, MARET, RANOE, STEIDELE, DARWIN, CONRADI, BALDINGER, SMITH, and ABERCROMBIE. The dashing of cold water over the lower extremities and abdomen of the patient, whilst he is kept in a standing posture, has likewise been directed by several physicians; but this practice, although occasionally of service, seems less successful than the judicious application of cold to the surface of the abdomen itself. When this cavity is distended, tense, painful on pressure, particularly in a circumscribed portion, with increased temperature of its surface, the cold douche, or the application of cloths moistened with vinegar and water, will often prove of advantage. Dr. BRANDIS, of Copenhagen, states that he has employed iced drinks, and cloths wetted with iced water to the abdomen, in ten cases with success; and that in some instances the practice requires to be persevered in for a long time, and assisted by antispasmodic and laxative enemata, and by opiates with stimulants and tonics taken internally.

79. *G.* When signs of depression of the vital energy manifest themselves in the advanced stage

of the disease, *stimulants* are required, and, if judiciously selected and combined, their exhibition will sometimes be rapidly followed by amendment. Wherever the lowering measures already noticed are followed by increase of the symptoms, particularly vomiting and restlessness, or by sinking of the nervous power or of animal heat on the surface of the trunk, antispasmodic stimulants and tonics should be conjoined, according to circumstances, with certain of the measures described above. Purgative tinctures are sometimes of service in this state, particularly the tinctures of aloes, with liquor potassæ, and tinct. hyoscyami; and the tincture of senna, with spirit. ammon. succinati and spirit. anisi, in large or often repeated doses. Notwithstanding constant or even fæulent vomiting in this stage, advantage will sometimes be derived from a full dose of *unrectified oil of turpentine* (from 3 iv.—x.), taken on the surface of aqua pimentæ, to which either spirit. anisi, tinct. cardamom. co., or tinct. capsici, has been added. I have seen the vomiting cease, and the distension of the abdomen rapidly subside, immediately after this draught, which should be repeated if the former has been thrown off. A full dose of common oil of turpentine, taken by the mouth, has a singular effect in constricting, and, as it were, drawing the small intestines close to the root of the mesentery; so that, in cases where I have given it, and in which hernia had chanced to exist, the hernial sac has become quite empty soon after its exhibition. May not the advantage obtained by it occasionally arise from the disentanglement of a constricted or imprisoned portion of intestine by this mode of operation, as well as from its influence in restoring the action of the paralysed and dilated coats of the bowel in other cases? In many states of inflammatory action, particularly those attended with exhausted tone of the capillaries and depressed vital power, it is one of the most active means we possess of preventing gangrene or effusion, and of restoring the natural action of the vessels.

80. *H.* In some cases, after depletions have been carried far, or in nervous and irritable habits, the inverted action of the stomach and upper part of the alimentary canal appears to continue in consequence of the vital exhaustion and irritability of parts; but, if these states were put a stop to for a while, and the powers of life supported, the natural action of the bowels—respecting the immediate restoration of which the patient is often injuriously harassed—would generally at last return. Under such circumstances, pills consisting of the *oxide of bismuth*, *camphor*, and *opium*, frequently repeated; or of the first of these, and extract of *hop*, or of *henbane*, or the *hydrocyanic acid*, in the recent oleum amygdal. dulcis, or oleum olivæ, in moderate but rather frequent doses, and occasionally with an aromatic spirit or distilled water; will often prove of service, particularly when aided by the external means about to be recommended. When thus exhibited, the prussic acid has a restorative effect; and it is still further beneficial when associated with suitable stimulants, as camphor, æther, &c. In a few instances I have inferred, from the situation of the pain, and other symptoms, that the disorder originated in the duodenum or jejunum; and in these especially, the oxide of

\* Mr. BUREAU recommends the use, and gives a plate descriptive, of a simple hydraulic apparatus for injections, the same in all respects as one lately introduced into this country from France, under the name of clysmaduct, but which is suited only to the injection of water.



bismuth and the prussic acid have been of considerable benefit. The *ammoniated tincture of guaiacum*, with *paregoric elixir*, in full doses, and given in milk, or in the recent oil of almonds or of olives, or in linseed oil, has also occasionally proved of advantage. The *acetate of morphine* is sometimes of service in allaying the distress, anxiety, and irritability of the stomach and diaphragm; but it should be prescribed in an aromatic spirit, and in a dose which will secure its anodyne effect without sinking the vital energies. I have used the following with marked advantage, repeating the dose every two hours until an effect was produced: —

No. 142. R. Acetatis Morphinæ gr. iv. ; Spirit. Myristicæ et Spirit. Pimentæ aa 3j. ; Spirit. Camphoræ et Tinct. Benzoini Comp. aa 3 ss. Solve. Capiat 3j. ad 3 ij. in Saccharum, vel Syrupum, vel Olea supra memorata.

81. I. The *ingestion of crude mercury*, or of *globules of lead*, to the extent of one or two pounds, has been recommended in ileus by several authors, particularly in that state of the malady which presents the symptoms indicating invagination of a portion of intestine. SYDENHAM, SCHENCK, BELLOSTE, PARÉ, PANZANI, HOFFMANN, SAGAR, QUARIN, NEVINSON, DARWIN, ABERCROMBIE, and many others, have noticed this practice; some of them, as SYDENHAM and QUARIN, in doubtful terms — others more favourably. M. ROLLAND has detailed the history of a case, wherein, other means having failed, he gave about 10 ounces of crude mercury, which, after a short time, occasioned a sensation of change in the position of some part within the abdomen, instantly followed by relief. Similar instances have been recorded by Dr. UWINS and Dr. BELLUCI. I have never tried this metal; but, many years ago, I saw a patient — a female between twenty and thirty, — relieved from all the characteristic symptoms of this state of the disease by the ingestion of about two pounds of common shot, which also has been recommended in volvulus, by many of the best medical writers of the three last centuries, and by some of them in preference to quicksilver. Large blood-lettings, the tepid bath, and various other means (§ 54. 77.), should generally precede the ingestion of lead or quicksilver.

82. K. Various *external means* besides those already noticed, have been recommended in ileus. SAGAR\* states, that he was cured of volvulus, by having the abdomen, at the commencement of the attack, kneaded like dough, with oiled hands, — a plan instituted evidently with the view of disentangling a displaced portion of bowel. ARETÆUS, and PAUL of ÆGINA, directed *cupping* on the abdomen. CELSUS advised *dry cupping* on both the loins and abdomen; but little advantage can be expected from this latter measure, unless it be performed by one capacious vessel, as is, I believe, occasionally done in some northern continental countries. QUARIN states, that in an extreme case, all other means having failed, and the pulse being small and irregular, the extremities cold, the countenance sunk, with hiccup, &c., he had recourse to dry cupping, using for the purpose porcelain bowls. Relief soon fol-

lowed, and the bowels were copiously evacuated, their action having been assisted by enemata of infusion of chamomile flowers and tartarised soda.

83. L. Dr. ABERCROMBIE expresses himself in favour of *large blisters* on the abdomen; but much more certain and immediate relief — often within ten minutes after its application — is derived from the *hot spirit of turpentine fomentation*, placed over the whole abdomen. Where there is little or no tenderness of this cavity, I have, however, preferred inunction of its surface with one of the liniments above directed (§ 51.); keeping subsequently a cold turpentine epithem applied. FORBES, WILMER, and BALDINGER also advocate the use of blisters on the abdomen; but MEIER prefers placing them on the insides of the thighs. The recommendation of SYDENHAM, to keep a young dog constantly applied to the abdomen, will appear to many a singular remedy; but the views with which he prescribed it are by no means devoid of reason.

84. M. Numerous writers antecedent to the time of QUARIN, and subsequently, have recommended *an incision* to be made *through the parietes of the abdomen*, and the internally strangulated, or the invaginated, portion of bowel extricated through it. NUCK has recorded a case where this operation was performed with success. VAN SWIETEN objects to it, the uncertainty of the existence of volvulus or internal strangulation. But, in several cases of invagination which I have seen, and in a great many I have perused — almost all those, the history of which has been fully detailed — the symptoms described (§ 40.) as characterising this state were present, particularly the tormina, followed by desire of evacuation, and tenesmus, with the discharge of a little bloody mucus or water; the oblong tumour, in a part of the abdomen, admitting of being recognised at some period of the disease; have been superadded to the other symptoms of ileus, and pointed out its precise nature. In two cases I felt inclined to have had the operation performed; and, indeed, suggested it. The diagnosis was found correct on examination after death. A case is given by Dr. FUSCHIUS, in HUFELAND's *Journal* for February, 1825, almost identical with one of these, and characterised by the above diagnostic symptoms, in which he resorted to this operation over the place to which the patient referred the sensation of obstruction, and where an obscure oblong tumour, in the situation of the ascending colon, was detected. An invagination of the colon was removed, and the patient perfectly recovered. The reader need not be informed that ileus very commonly proceeds from strangulated hernia, and sometimes persists from adhesions, &c. after the displaced bowel has been returned. The propriety of having an early recourse to the operation after we fail in returning the protruded intestine is here very obvious.

85. N. *During, and subsequent to, convalescence* from ileus, the patient should wear flannel next the skin, and promote the functions of the stomach and bowels by vegetable bitters combined with gentle aperients, and the sub-carbonates of the alkalies. The bulky and flatulent vegetables ought to be avoided, and the extremities and surface of the abdomen and loins kept equably warm. The utmost attention should be paid to diet; all

\* "Olim Crisii incidi in hunc morbum (volvulum) ego; Hungarus Sartor accitus me restituit intra tres horas methodo sequenti: impositum me supinum prato, inunctisve oleo olivarum manibus suis deprecabat prout pistores pastam panis subtiliter incipiens successive semper fortius totum abdomen meum." (p. 320.)



indigestible substances, and acid or acerb beverages, carefully avoided.

86. III. TREATMENT OF SYMPTOMATIC OR COMPLICATED COLIC. — *A.* The means of cure in most cases of this description should be directed to the diseased viscus, by which the functions of the alimentary canal are affected. *a.* Those colicky symptoms which are produced by irritation, or the passage of *gall-stones* through the common bile-duct, and by the obstruction occasioned by *concretions* in the intestines, will generally be relieved by nearly the same treatment as that recommended in this article; but whatever difference should exist, is detailed in the article on *CONCRETIONS*. *b.* The colic which is symptomatic of *worms* in the intestines requires, if the attack be severe, the internal and external means already recommended to allay the urgent symptoms; but after this is accomplished, the remedies resorted to for the cure of verminous disorders should be employed. (See art. *WORMS*.)

87. *B.* The occurrence of colic from *affections of the kidneys*, particularly from calculi in their pelvis or ureters, should not be overlooked by the practitioner; nor should he forget that it is sometimes consequent upon *aneurism of the abdominal aorta*, and of *tumours* formed in the *mesentery*, or in the omentum. *a.* In the first of these pathological states, much relief will be afforded by the alkaline sub-carbonates, with opiates or sedatives, and followed by oleaginous purgatives and enemata, in addition to whatever depletory or other measures the circumstances of the case will point out. The use of liniments with camphor, soap, and opium, rubbed on the abdomen and loins, will also give much relief. *b.* In colic depending upon the latter organic changes, little beyond palliating the urgent symptoms by the remedies now mentioned, can be expected.

88. *C.* *Flatulent* colic, generally of a prolonged description, and often not easily removed, at least in a permanent manner, sometimes occurs in the course of *asthma* and *bronchorrhœa*, owing apparently to the interrupted functions of the mucous surface of the lungs; the evolution of gaseous fluids, from the blood being impeded on this surface, but supervening vicariously on that of the alimentary canal. In such cases, after the bowels have been freely evacuated, carminatives combined with ipecacuanha and hyoscyamus; the infusion of valerian, with prussic acid, and spirit. anisi; powders of magnesia, oxide of bismuth or of zinc, and ipecacuanha; sulphate of zinc, with myrrh, camphor, and opium or hyoscyamus; and camphor mixture, with extract of belladonna, spiritus ætheris sulphur. comp. and spirit. menthæ; are among the means which will afford the greatest relief.

89. *D.* There are few more common complications than *hysteria* and *colic*; but the treatment varies not materially from that now stated. *a.* In such cases, the functions of the uterus require strict attention; for morbid sensibility, and even vascular excitement, both of this viscus and of the ovaria, are often present. The treatment too commonly adopted in this state of complication, although it may give immediate but temporary relief, not infrequently perpetuates the pathological state, of which both hysteria and colic are merely symptoms. Instead of employing medicines which excite both the digestive mucous

surface and the generative organs, in these cases, cooling and soothing remedies are much more appropriate to them, such as those above enumerated (§ 87.); local depletions, nitrate of potash, sub-carbonate of soda, extract of hop, cooling aperients, vegetable tonics, exercise in the open air, &c. *b.* When the complaint is symptomatic of difficult menstruation (§ 43.), general or local blood-letting may be resorted to in the plethoric subject; but in the weak or hysterical, camphor, ammonia, soda, &c. with hyoscyamus; or the acetate of morphine or laudanum given in some aromatic spirit, the ammoniated tincture of guaiacum in linseed tea, the preparations of rue and of juniper, and the treatment detailed in the article on the *Disorders of MENSTRUATION*, will generally give speedy relief. *c.* Colicky pains sometimes occur during *pregnancy*: in such cases, cooling aperients, with antispasmodics and opiates or other anodynes, and preceded by sanguineous depletion, if congestion or plethora exist, will remove all disorder. *d.* Severe attacks of colic are not uncommon upon *suppression* of the *menses* or of the *lochia*. If a tendency to inflammatory action manifests itself, and especially if the patient be plethoric or robust, general or local depletion should be practised; a dose of a mixture composed of a decoction of the radix rubiæ, tincture and syrup of saffron, and as much borax as it will dissolve, should be given every two hours; the volatile liniment with camphor and opium ought to be rubbed on the abdomen; and, afterwards, a fomentation with the decoction of poppy-heads, &c. applied to the same situation. SCHMIDTMANN advises a cataplasm, consisting of marshmallows, henbane, bruised linseed, and poppy-heads, to be placed warm on the abdomen; and the steam of hot water to be conveyed to the pudenda. *e.* If colic proceed from *congestion* or *inflammatory irritation* of the *uterus* or *ovaria*, local depletions; diaphoretics, and refrigerants, combined with sedatives; aperients, with cooling emollient enemata, and low diet, are the most appropriate remedies.

90. *E.* Colicky complaints are not infrequently referrible to *congestion* and *irregular vascular action* in the *liver*, *pancreas*, or *spleen*; or, if not arising from such disorders, are associated with them, owing to deficient energy of the organic nervous system; and, consequently, to imperfect performance of the abdominal functions generally. *a.* In cases of this kind, local depletions, followed by purgatives, exerting a chologogue and deobstruent action, external irritation, and, subsequently, by vegetable tonics, laxatives, regular exercise, and a course of the Leamington, Harrogate, Buxton, or Cheltenham, mineral waters, or the artificial waters of Carlsbad, Spa, Ems, &c., according to the circumstances of the case, will generally remove all disorder. Impeded circulation through the portal system, is more or less concerned in the causation of colic pains in these cases; the return of blood through the mesenteric and hæmorrhoidal veins deranging the contractile actions of the intestines, and giving rise, in many cases, particularly those in which this pathological state obtains, to the additional association of hæmorrhoidal affections, which, if neglected, may terminate in anal fistulæ. *b.* It is not un-



common to find a severe attack of colic usher in hæmorrhoidal discharges: the impeded circulation through the portal vessels, and the consequent fits of colic, being both relieved by the consecutive hæmorrhage from the hæmorrhoidal veins and mucous surface of the rectum. In almost all such cases, in addition to the congestion and associated disorder of the assistant chylopoietic viscera, there are more or less vascular plethora, impeded secretion generally, and deficient energy of the organic nervous system,—a complicated state of disorder evidently requiring local depletions from the region of the liver, or, as Continental practitioners very reasonably prefer, from the vicinity of the anus, with the remedies above stated, and assisted by regular exercise, gentle tonics, aperients, and a regulated diet and regimen. From this it will not appear singular that very dangerous attacks of colic, or even of ileus, will sometimes occur after the operation for hæmorrhoids or anal fistulæ, or other morbid states of the rectum, when performed, as they sometimes are, without previous medical treatment of a kind appropriate to the state of internal disease. *c.* The complication of colic with either acute or chronic jaundice is evidently referrible, either to the passage of gall-stones (§ 86.), or to the pathological state of the liver now noticed, or to inflammatory action in the duodenum or biliary ducts, or, lastly, to congestion of bile in the hepatic ducts, or in the gall-bladder. When symptoms of local plethora or congestion can be detected, cupping, and the rest of the treatment now directed, will be serviceable. (See JAUNDICE—*Treatment of.*)

91. *F.* When the colic arises from atonic, misplaced, or erratic gout, large doses of the sub-carbonates of the alkalis, or magnesia, with camphor or ammonia, are required, followed by blood-letting, if the pulse, habit of body, and strength of the patient admit of it; by calomel, with camphor and hyoscyamus, or opium, at bed-time; by active cathartics, conjoined with stimulants and restoratives, as long as the alvine evacuations indicate the propriety of their exhibition; by purgative and antispasmodic injections, and by rubefacients and sinapisms to the lower extremities. After morbid secretions and retained fæces are evacuated, colchicum may then be given with ammonia, or with camphor and magnesia. But *arthritic colic* occurs most frequently in aged persons, or in those with exhausted constitutions, in whom, instead of evacuations, beyond the expulsion of morbid secretions, active stimulants,—as large doses of camphor and ammonia, or of guaiacum and ammonia,—with warm spices, Cayenne pepper, and sometimes combined with opium or aconitum, and assisted by sinapisms, are indispensably requisite.

92. *G.* If colic supervene on the disappearance or suppression of *rheumatism* from the joints or aponeurosis, or the repulsion of *chronic eruptions*, local depletions, followed by camphorated liniments and fomentations; warm turpentine epithems applied on the abdomen; calomel, with antimonial preparations, or with ipecacuanha and opium; warm vapour and fumigating baths; the sub-carbonates of the alkalis, sulphur, the compound decoction of sarsaparilla, or the decoction of dulcamara; blisters, tartarised antimonial plasters

or ointments, saponaceous and oleaginous enemata; and sinapisms to the extremities or parts primarily affected; constitute the chief means of cure. The frequency, and, in two of the forms of the disease especially, the danger, of the complaint now discussed have induced me to be more circumstantial in the account of its pathology and treatment than may appear requisite to many: but I am convinced that the experienced practitioner will not be of the number; but will find cause to regret, with myself, upon reviewing his knowledge, that his information on the subject is not greater than his means of observation have yet afforded him, or my labours can possibly assist him in obtaining.

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Those who wish to be acquainted more fully with the opinions of the writers of the fifteenth, sixteenth, and seventeenth centuries, as to *Ileus* and *Colic*, will find them detailed at considerable length in *BONER's Polyalthes*, &c. fol. vol. i. p. 500. et seq.; in his *Mercurius*, fol. p. 115.; and in *MANGET's Bibliotheca Medico Practica*, fol. vol. i. p. 575. Although I have not availed myself of these collections in any way, owing to my circumscribed limits, and desire to give more precise information of a later date, and more in accordance with my experience, than that which they furnish, yet will they be found to contain much of what has been considered of much more modern date, and, when sifted from the refuse, of no mean value.

The *Bibliography* of these diseases, in *PLoucquet's Med. Digesta*, is brought down to the commencement of this century; but many of the references are inaccurate: that by *YOUNG* is very scanty, and not select. The list appended to the art. *Ileus*, in the great French Dictionary, is entirely a catalogue of *Theses* on the subject, of no value; instead of consisting, as it ought, of references to the experience of the best practical writers.

COLON.—*SYN.* Κωλον. *Der Grimmdarm*, Ger. *The Large Bowel*.

1. The colon is very often the seat of disease, the rest of the alimentary canal being but lightly affected. In some complaints, as *constipation*, *colic*, and *dysentery*, it is the part principally disordered; and in others, as *indigestion*, *diarrhæa*, *ileus*, *peritonitis*, &c., it participates in the disease with the rest of the digestive organs. The investigation, therefore, of these maladies necessarily includes the consideration of the chief morbid states of this viscus. But there are other derangements which require a brief notice at this place, and which do not belong to these diseases, or to those changes of structure that are common to it and the rest of the alimentary canal, and which will be considered in the article on the *Pathology of the Digestive Canal*.

TORPOR OR ATONY OF THE COLON, AND ITS CONSEQUENCES.—CLASSIF.—I. CLASS, I. ORDER (*Author*).

2. DEFIN. *General debility, with indigestion; slow or irregular state of the bowels; distension, borborygmi, or stridulous noises, in the course of the colon; frequently pain or uneasiness, sometimes with tumours in some part of this viscus.*

3. i. ITS PATHOLOGY.—Atony and distension of the colon may be variously associated with other disorders. They obtain more or less in all cases of constipation and colic which depend not upon inflammation, or upon diminution or constriction of the canal of the intestines; and they are also often complicated with torpor of the liver, and deficient secretion from the internal surface of the colon. Distension is usually occasioned by flatus or fæcal matters; and it may produce little or no inconvenience, beyond constipation, until it reaches a great extent; but it frequently gives rise to *flatulent* and *stercoraceous colic*, and even to *ileus*. The gases found in the colon are azote, carbonic acid gas, and carburetted hydrogen, in varying proportions; and, when they accumulate largely, they always produce borborygmi or an unpleasant or painful sense of distension, and constipation or colic. *A. Flatulent distension of the colon* (see *FLATULENCE*) is commonly dependent upon want of vital tone of the digestive organs generally, and of this viscus particularly. In irritation or inflammation of the bowels, flatus is also generated in great quantity; but it is usually expelled quickly, especially when they are unobstructed, owing to reaction of their muscular coats. Much doubt exists as to the source whence this flatus proceeds. The circumstance of its rapid reproduction after its evacuation, when the bowels contain no substances which could give rise to it, and various physiological considerations, lead me to infer that it is in great measure exhaled from the digestive mucous surface; the gases consisting chiefly of those which pass into, or are formed by, the blood; and, in health, are afterwards given out from it, on the mucous surface of the lungs. Persons who often expel the flatus from the lower bowels, where it evidently is destined to perform useful purposes



in the economy, are most subject to an atonic state of the colon, and to a continued as well as an increased generation of the intestinal gases: and, when circumstances prevent the accustomed frequency of their discharge, are most liable to experience the effects of their accumulation. Atonic distension of the colon by flatus is also a common attendant upon congestion of some one or more of the abdominal viscera, and even upon general vascular plethora, particularly when it oppresses the circulating energies. It also often accompanies hysteria: and, owing to the increased sensibility of the organic nerves, as well as to the morbid irritability and irregular action of the muscular fibres of the bowels, gives rise to various painful sensations in their course, and to anomalous states of disorder.

4. *B.* When an atonic and flatulent state of the colon is associated with morbid irritability of the muscular coat, painful sensations in some part of the course of this viscus are frequently complained of, particularly by females; are by them often referred to its left arch and descending portion; and are attended by loud croaking or stridulous noises, especially upon full respiration and mental emotion. The bowels are usually constipated, and attempts at evacuation are accompanied with slight tenesmus, the stools being discoloured, hard, slimy, or in lumps. The abdomen is tumid; and tenderness, often shifting its place, and varying in degree or duration, is sometimes felt. The whole digestive organs necessarily participate in this state of disorder, and perform their functions imperfectly. The nervous system of organic life acquires increased sensibility; the cerebro-spinal system becomes morbidly susceptible of impressions, particularly in females; the countenance is pale, slightly discoloured, and often covered by an oily moisture; the tongue is loaded, flabby, sometimes large, presenting fissures on its surface, and the impressions of the teeth on its edges; the pulse is weak and soft; and a sense of distension and oppression follows a full meal. This state of disorder is very frequent in young females, who take not sufficient exercise; and, when neglected, is often the forerunner of more serious ailments, both of the bowels and of the generative organs.

5. *C.* Deficient vital energy of the colon also gives rise to relaxation or irregular action of its coats, to constipation, and to collections of fœcal matters, generally with more or less flatulence. *Fæcal accumulations* to a great amount is most commonly met with in aged females, or persons far advanced in life, who have injured the tone of the bowel by the frequent use of cathartics, and have passed a sedentary and luxurious existence. They also occur, but to a much less extent, in children and young persons, especially females from the ninth to the eighteenth year of age, and even upwards. Sometimes they occasion large tumours, particularly in the cæcum and sigmoid flexure, but occasionally also in the transverse arch and other parts of the colon. When distension proceeds from retained fæcal matters, in addition to the local signs observed on careful examination and percussion of the abdomen in the course of this bowel, numerous symptomatic ailments are complained of. These vary but little from those described above (§ 4.), and in the article treating of accumulations in the

CÆCUM (§ 11.). The countenance and skin are generally foul, unhealthy, and devoid of animation; the perspiration is thick, clammy, fœtid, and oleaginous; the breath very offensive; the tongue loaded or furred; the lips and gums are pale; muscular energy is much diminished; the appetite imperfect or capricious; digestion difficult; headach or vertigo is often present; the abdomen is tumid, doughy, and inelastic; the urine is loaded; the bowels are either constipated or irregular, or, if daily evacuations take place, the motions are slimy, very dark or otherwise discoloured, scanty, and offensive; and the pulse soft, weak, often slow, but afterwards accelerated. In many cases, pains in the loins, abdomen, and limbs, are complained of, with mental inactivity, general lassitude, oedema of the lower extremities, flabby inelastic state of the soft solids, leipothymia, or fainting, upon quickly assuming the erect posture, and occasional fits of sinking, especially in females.

6. Although torpor of the colon is most frequently followed by fæcal accumulations and distension, yet these are neither constant nor necessary results of this state, at least to any very manifest extent; for sordes and fæcal collections may be very injurious to the mucous surface, without proving so from their bulk or mechanical effects only. Indeed, they are often noxious from their acrimony, without occasioning remarkable distension, or any degree of obstruction, particularly when the vital energies are depressed. Their presence, therefore, should be inferred rather from various remote symptoms, than from those which are referrible to the colon itself. But, whenever disorder of remote organs leads us to suspect torpor of this bowel, the practitioner should make an accurate examination of all the abdominal regions, commencing with that of the cæcum, following the course of the colon, between the ilium and right ribs, below the epigastrium, and under both hypochondria, to the left side and iliac fossa, and to the hypogastrium. If a sensation of doughy fulness be felt by the examiner, in any part of its course, the internal surface of the bowel is probably lined with sordes and accumulated secretions, which its vital energy has not been sufficient to throw off. If hardness be felt, with more or less tumour, fæcal collections are most likely formed. But the evidence furnished by this examination should not satisfy us: we should enquire after the symptoms stated above, particularly the foul or clammy tongue, fœtor of the breath, unnatural state of the countenance and cutaneous surface, and the offensive and morbid evacuations usually attendant upon this ailment. A belief is too generally entertained, that fæcal matters and sordes will not accumulate in the colon, unless the patient has been constipated. But they may collect in its cells, the more central part of the canal allowing daily evacuations; and they may even remain there for a considerable period, producing much irritation, and even a relaxed state of the bowels; thereby misleading the judgment of the practitioner as to the pathological state constituting the disorder. How, therefore, is he to form an accurate opinion? By a careful examination of the abdomen in the course of the colon, of the urine, of the stools, and of all the organic and animal functions, and by ascertaining the pre-



sence of the symptoms enumerated above (§ 4, 5.). In many cases, when the morbid collections have become acrimonious, an irritative diarrhoea continues for some time, or recurs at intervals, before the morbid matters are fully thrown off, owing to spasmodic constrictions of parts of the bowel. On these occasions the stools are watery or fluid, and are apparently composed of discoloured fæces, broken down and mixed in a liquid; at other times they are dark green, muddy, putrid, &c.; very frequently they are slimy, containing lumps of hardened fæces, very offensive, and of a dark green or brownish black hue; and their evacuation is preceded by griping, tenesmus, or a scalding sensation at the anus.

7. *D.* Imperfect action of the colon is evidently dependent upon deficient vital energy of the frame, owing either to original conformation, or to various causes of exhaustion, acting chiefly on the digestive canal and associated viscera, with more or less torpor of the biliary functions. When allowed to continue, it perpetuates and augments the morbid condition in which itself originated; drawing other organs within the sphere of disease, particularly those of mental manifestation, and of generative function, in the female. In young persons it often occasions, or is complicated with, curvatures of the spine, chorea, chlorosis, retention or suppression of the menses, nervous tremors and convulsions, &c., and when the distension of the colon is great, dyspnoea or shortness of breathing, palpitations of the heart, &c.; these affections appearing oftener, perhaps, along with it, as associated effects of depressed vital power, than as consequences of this particular lesion of function.

8. *E.* The more remote causes of torpor and distension of the colon are, confinement in close and crowded apartments during the greater part of the day, and sleeping in chambers similarly circumstanced; constrained and sedentary positions, in which the abdominal muscles remain nearly inactive; premature and excessive cultivation of the mental, to the neglect of the physical, powers,—the discipline of modern boarding schools; the inappropriate combination and use of purgative medicines; indolent and luxurious habits; occupations which prevent bodily activity, and particularly those performed by the assistance of machinery, and in hot foul air stagnant in crowded manufactories; pre-existing debility of the stomach and digestive canal, or of the frame generally; paraplegia or hemiplegia; disease of the spinal column, its membranes, or chord; neglect of the first intimation to alvine evacuations; venereal excesses; the disgusting habit of expelling the flatus from the bowels; and by whatever weakens, either directly or indirectly, the vital manifestations of the alimentary canal, or disorders the general health.

9. *Local and constitutional effects produced by torpor of the colon.*—*A.* Owing to the course and connections of the colon, to the remote causes above enumerated, and to the depression of digestive and vital energy they occasion, the matters discharged into this bowel from the small intestines, and the secretions from its own internal surface, are liable to be retained for a long time. Fæcal accumulations and obstruction have been now shown necessarily to follow such retention. It may be next requisite to point out certain of the

most important and frequent consequences of these states:—*a.* One of the most immediate is the retention of the mucous secretion within the follicular glands, as well as in the ducts leading from them; causing distension, and subsequently inflammation and ulceration of them. *b.* The retention of fæcal matters in the colon is often followed by absorption of much that otherwise would have been excrementitious, both into the general current of the circulation, and, at first, at least, into the blood which flows into the portal veins, where it often excites and irritates the liver, and either is partially removed by this viscus, giving rise to increased or vitiated biliary secretion, or contaminates the whole circulating and secreted fluids. *c.* The bile also may, particularly in warm countries, and in persons in whom it is habitually secreted in excessive quantity, be rapidly conveyed along the small intestines with the chyme, and yet be retained too long in the cæcum and colon, whence it may be absorbed, with a portion of excrementitious matters, into the circulation, and give a lurid or unhealthy aspect to the countenance, and occasion various constitutional ailments, characterised chiefly by lassitude, debility, irregular action of the bowels, loaded urine, and a foul tongue. *d.* Fæcal accumulations, when allowed to remain too long in the colon, and thereby to give rise to gaseous and noxious formations, not only impede many of its functions, but also favour changes in the vascular action and structure of its coats, particularly of its mucous, sub-mucous, and muscular tunics,—the first and second becoming irritated, inflamed, or even ulcerated; the third over distended, and thereby deprived of its power of salutary reaction. *e.* Among the most common consequences, also, of torpor and fæcal infarction of the colon, are hæmorrhage from it and the rectum, and hæmorrhoidal tumours, arising immediately from the foregoing changes, and from interrupted circulation through the hæmorrhoidal veins.

10. *B.* The effects of over-distension of the colon upon the other abdominal viscera, owing to the extensive connections subsisting between them and this bowel, may be readily inferred. *a.* The distended cæcum and sigmoid flexure of the colon press injuriously upon the femoral nerves and blood-vessels, the ureters, and the internal iliac veins; producing numbness, cramps, pains, and, owing to the impeded return of blood, more or less œdema, of the lower extremities. The ascending and descending portions of the colon press upon the kidneys and adjoining vessels, occasioning disorder of the urinary secretion, with a sense of weight, or dull aching pain in the loins. Distension of the right and left flexures, and transverse arch, deranges the functions of the biliary organs, the duodenum, stomach, and spleen. *b.* If the colon be distended to the utmost, not only are all these consecutive disorders much increased, but the descent of the diaphragm is also much impeded, and the actions of the heart and lungs materially affected; occasioning palpitations, intermissions, and irregularity of the pulse, dyspnoea, and a short and rapid respiration. Owing to this effect upon the circulating and respiratory organs, the return of the blood from the head is retarded, various nervous ailments, and headach, are occasioned; and determination of blood to, and con-



gestions and effusions of serum on, the brain and its membranes, supervene as the more remote effects. *c.* Fæcal or flatulent accumulations in the colon affect, in a very evident manner, the functions of the small intestines and stomach, or increase disorder in these viscera, when it previously exists,—a circumstance of frequent occurrence, the function of digestion being equally impeded with that of defæcation, and owing to the same primary pathological state, namely, imperfect manifestation of vital power throughout the organic nervous system. Hence the indigestion, the acid and flatulent eructations, and the imperfect chylification and nutrition, so frequently associated with torpid function of the large bowels. *d.* In children and young persons, the mucous sordes, morbid secretions, and excrementitious matters, that collect as a consequence of this state, become not only a nidus for worms—remarkably favouring their generation; but also a cause of irritation to the mucous surface, to the absorbing vessels, and to the mesenteric glands, owing to their partial absorption, either alone, or with whatever chyle may be formed. That diseases of the intestinal mucous surface, and that obstruction and enlargement of these glands, with the consequent *marasmus*, &c., often arise from the morbid impression and irritation caused by these retained excretions, an extensive experience in the diseases of children has fully convinced me; and that dysentery and diarrhœa, among this class of patients, as well as in adults, frequently proceed from this cause, more especially in warm and unhealthy climates, will be acknowledged by every experienced practitioner. *e.* Even many of the diseases that affect the skin, and chronic ulcers of the lower extremities, arise from the absorption from the large bowels of excrementitious matters, that irritate and inflame, in the course of their elimination from the blood by the cutaneous function, the delicate vascular tissue subjacent to the cuticle. This is particularly the case in warm countries and seasons, in which the quantity of these matters always passing out of the circulation by the skin is much greater than is usually supposed. Whatever opinion may be formed as to the origin of such affections, there can be no doubt that the treatment based upon this doctrine is the most successful in removing them. *f.* Among other consequences of fæcal accumulations in the colon, elongations and displacements of this bowel may be ranked; and, when these changes take place, they increase the disorder which occasioned them. It has often been remarked, particularly by ESQUIROL, HINZE, and others, that displacement of the colon is one of the most common morbid appearances found in the bodies of hypochondriacal and melancholic persons. Torpor or atony of this viscus favouring fæcal accumulations in it, is an important characteristic of these affections, and is manifestly connected with the causation of displacement of the large bowel. (See art. HYPOCHONDRIASIS, &c.)

11. ii. TREATMENT.—The indications of cure in cases of torpid function of the colon, consist—1st, of evacuating whatever fæcal or acrimonious matters may have collected in it; and, 2d, of restoring the energy of the digestive organs, and directing such regimen as may prevent a return of this disorder. *A.* Many practitioners, deceived

by the reports of the patient, or misled by the appearances of the stools procured by the first purgatives prescribed, stop far short of the point to which these medicines should be carried. It is not sufficient to order two or three doses of purgatives, or even of active cathartics; but they ought to be repeated, or continued so as to secure their full effect, and be combined with such other medicines as will promote their operation without weakening the parts which they stimulate, and will prevent the patient from being debilitated by them. In all affections of the colon, purgatives that procure full, bulky, and not frequent or watery evacuations, should be selected. The preparations of aloes (F. 181. 454.), those of senna combined with gentian (F. 266. 430.), castor oil, rhubarb and magnesia, precipitated sulphur (F. 45. 82. 96.), the compound jalap powder, &c. (F. 635. 636. 652.) operate in this manner; and, particularly when we wish to promote the secretions from the intestinal surface, may be exhibited after a dose of calomel or blue pill taken at bed-time; or the compound extract of colocynth, or the aloes and myrrh pill, or jalap, may be combined with one of these mercurial preparations, and the extract of hyoscyamus (see F. 462. 471. 881.). When it is necessary to continue the exhibition of purgatives, they should be either alternated with tonics, or combined with vegetable bitters, which will both promote their action, and increase the strength of the patient (see F. 562. 572.). When the motions are morbid, great advantage will be derived from resorting to the use of clysmata, as recommended in the article COLIC (§ 57. 66. 77.). If fæcal collections to a great extent have formed, they are indispensable remedies; and if symptoms of obstruction, or of irritation, or chronic inflammation, are manifest, they should be assisted by the external means there advised (§ 66. 83.). Under every circumstance, the exhibition of purgatives by the mouth, and of enemata, should be persisted in until the stools assume a natural appearance. (See also the *Treatment of diseases of the CÆCUM*, and of CONSTIPATION).

12. In cases where retained matters in the colon have occasioned irritation, such clysters as will promote the full evacuation of its contents, and at the same time allay irritation, ought to be resorted to from time to time. These will relax irregular constrictions of the bowel, promote the operation of purgatives given by the mouth, dissolve hardened fæces, and loosen the adhesion of tenacious secretions lodged in its cells. In cases of this description, the soap injection, with, or without, the addition of castor or olive oil, the compound decoction of barley with common salt, or the soda tartarizata; the infusum lini, with the sub-borate, or the sub-carbonate of soda and assafoetida; the decoction of marsh-mallows, with the infusion of camomile flowers and linseed oil; and the turpentine triturated with white of egg or mucilage; will have a most beneficial effect, particularly when assisted by appropriate laxatives taken by the mouth. When the irritation of the bowel appears to be accompanied by spasmodic constriction, the aperients should be combined with either camphor, ammonia, ipecacuanha, hyoscyamus, the compound galbanum pill, &c. (F. 463. 890.), according to existing cir-



cumstances. In cases of this kind, much debility is often present, and the functions of the stomach require the aid of light nutritious food and gentle tonics; the purgatives being exhibited either at bed-time, or early in the morning, so as not to disorder the functions of the stomach. Such eccoprotic or alterative laxatives as are slow in their operation (F. 503. 892.) should be taken at night, and purgatives or cathartics that are quick in their action early in the morning, so that they may not interfere either with necessary food or with requisite avocations.

13. When the fæcal accumulations cannot be removed by the above means, others of a more powerful nature, as the elaterium or croton oil, assisted by colocynth or terebinthinate injections; and the purgatives advised in the more obstinate cases of *colic* and *constipation*, assisted by shocks of electricity and galvanism passed through the abdomen; should be resorted to. When the bowels are acted upon with great difficulty, the stools being very black and offensive, we may generally infer that not only is the colon torpid, but the follicles are loaded or obstructed, and their secretion morbid. In these cases, galvanism, as shown in an instructive case by Mr. CLARKSON, promises to be of much service. In several instances, when the pulse has been weak, and the skin cool, I have added the extract of *nux vomica* to the purgative with much advantage, and combined a portion of this active substance with the liniment (F. 306.) which has been rubbed on the abdomen.

14. B. In order to prevent the re-accumulation of morbid matters in the colon, and give tone to the digestive organs generally, the patient should daily attend to the first intimations of evacuation, and promote the functions of digestion and defæcation, by resorting, whenever they flag, to aperients or laxatives, combined with tonics. Blue pill, with the aloes or myrrh pill, or F. 470., may be occasionally taken at night, and the tonic and aperient medicine (F. 266.) the following morning. The diet and regimen should be carefully regulated, and exercise be taken in the open air, either on foot or horseback. After health has been in a great measure restored, chalybeate mineral waters, and the artificial waters of Ems and Pyrmont, will be productive of much benefit; but frequently it will be more advantageous to commence with the Harrogate or Leamington waters, or with the artificial waters of Seidschutz, Eger, or Carlsbad, and have recourse subsequently to the chalybeates of Cheltenham or Tunbridge. In many cases, the warm or tepid salt water douche over the abdomen, sea-bathing, frictions of the surface of the body, and of the belly especially, night and morning, with either a hard towel or brush, will prove of much service.

15. II. UNNATURAL POSITIONS OF THE COLON, &c.—This viscus is not infrequently found misplaced, and forming singular flexures, in those who have suffered from constipation, fæcal retention, dysentery, hypochondriasis, or melancholia. But there are no constant symptoms by which such changes can be inferred with much certainty during the life of the patient. M. ESQUIROL found, out of 168 dissections of melancholic patients, the colon displaced in 33. This change had previously been remarked by MORGAGNI (*De Sed. et Caus. Morb. epist. iv. art. 16.*

*et seq.*), HALLER (*Elem. Physiol. l. xxiv. sec. 13. et seq.*), SOEEMMERRING (*De Corp. Hum. Fabrica, t. iv. p. 313.*), and WELLS, but unconnected with mental disorder. In many cases, the bowel is not only displaced, but is also elongated, without being divided, as in its natural state, into cells by partial partitions, and the tonic action of its longitudinal bands. These changes seem to be favoured by relaxation of the mesocolon, and by complete atony of those bands. An elongated and displaced state of the colon is common in cases of old hernia; and in these is often connected with a stretched appearance of the mesentery, but without any organic change of the coats of the bowel: but sometimes the unnatural flexure or duplicature is adherent at its opposite sides, forming a large loop, particularly when it has been consecutive of acute or inflammatory dysentery. Displacement may take place in any part of the bowel, but it is most common in the transverse arch and sigmoid flexure; the former part hanging down towards the pubis, generally in an unadhering, but occasionally in an adhering, loop; and the latter part crossing over to the right side of the abdomen, or passing behind the pubis. Duplicatures of the colon may also form at the right or left parts of its arch; the opposite peritoneal surfaces being more frequently, in such cases, adherent to a considerable extent by coagulable lymph. Several plates are given by Mr. ANNESLEY illustrative of this change; which is not infrequently observed in fatal cases of chronic dysentery, particularly in warm climates. That these unnatural flexures are also often caused by fæcal collections, and by obstructions to the fæcal discharges situated either in the rectum or in the sigmoid flexure of the colon, appears very probable; but they may also arise from a naturally elongated formation of the bowel. That, when once produced, they favour such collections, with their consequences, particularly severe dyspeptic and hypochondriacal ailments, dysentery, severe colic, or even ileus, and great distension or inflammation of the colon or small intestines, cannot be doubted; but that they will occasion insanity or melancholy, as ESQUIROL and HINZE suppose, seems not to be made out. Dr. YELLOLY states that Mr. LAWRENCE and Mr. DALRYMPLE, who have examined many bodies of insane persons, have very seldom observed in them any deviation from the natural course of the colon.

16. As we have no certain or even probable means of ascertaining the existence of these changes during life, it is unnecessary to offer any remarks on their *treatment*. But this is a matter of but little importance, as the disorders which they produce are in all respects the same as those already noticed; and even if their nature were recognised, they can be remedied or alleviated only by the means described above, particularly by laxative and solvent enemata; and by whatever will, whether taken by the mouth, or injected *per anum*, preserve a fluid state of the stools, or reduce them to a softened condition, and promote the healthy secretions and regular functions of the large bowels, and of the digestive organs in general. (See F. 82. 98. 144.)—(See art. DIGESTIVE CANAL, for the organic lesions of the colon; and arts. DIARRHŒA, DYSENTERY, and INTESTINES, for its other diseases.)

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COMA. — SYN. and DERIV. Κῶμα, *Profound Sleep* (from Κω, I lie down). *Carus*, Sauvages, Good. *Cataphora*, J. Frank. *Lethargie*, Assoupissement, Fr. die Schlafsucht, Schläffieber, Ger. *Sopore*, *Somnolenza*, Ital.

CLASSIF. 2. Class, Nervous Diseases; and 1. Order of this Class (*Cullen*). 4. Class, 4. Order (*Good*). IV. CLASS, III. ORDER (*Author*, in *Preface*).

1. DEFIN. *Preternatural sleep, with physical torpitude, and suppression of the mental powers.*

2. I. VARIETIES AND SYMPTOMS. — There are various modifications of coma, each of which have received different appellations, as *Lethargus*, *Cataphora*, *Agrypnia*, *Carus*, &c.; these names being also used generically by some authors, but more frequently specifically, as I shall apply them on this occasion. They are all most commonly symptomatic of pre-existing disease; but they are also occasionally primary affections. I shall, therefore, after describing very succinctly each variety of coma, and its more constant symptoms, notice it first as a primary affection, and next as an important phenomenon in other acute diseases, particularly of their severe forms or advanced stages: afterwards the different pathological states causing this affection, the signs which distinguish them, and, lastly, the means best adapted to relieve them, will be briefly stated.

3. i. COMA VIGIL — *Agrypnia*, Κῶμα ἀγρυπνῶδες (*Hippocrates*), TYPHOMANIA, *Sopor cum Agrypnia* — is characterised by a constant disposition to sleep, without falling into quiet, sound, or natural sleep; by low muttering delirium, or unconnected talk; unnatural action of the hands and fingers, sometimes also of the feet; pale sunk countenance; a natural or but slightly increased temperature of the head; by the patient opening the eyes and staring about upon the slightest disturbance, or starting up as if frightened by strange sights, and again attempting to lie down; and sometimes by difficulty of speech and of swallowing liquids.

4. ii. LETHARGY — *Lethargus* \* (from λήθη,

*Lethe*, et ἀπυος, *celer*), *Veternus*, Lat. — is characterised by slight but constant somnolency, or mental and corporeal torpor, evidently depending upon a morbid condition of the brain; when addressed, the patient answers forgetfully, and afterwards sinks into the same state as before. This is a slighter grade of the following varieties, and may pass into them.

5. iii. COMA SOMNALENTUM — *Cataphora* — is characterised by sopor or profound sleep, without the power of wakenings spontaneously; the patient, when roused, slowly opening the eyelids, and answering either rationally, forgetfully, or incoherently, but immediately afterwards falling into the same state of profound sopor; and frequently by relaxation of the muscles of the lower jaw, it thereby differing from apoplexy and carus.

6. iv. *Coma profundum* — *Carus*, Κάρπος — is characterised by its more or less sudden invasion; by the profound sopor, the eyes being shut as in a deep sleep, and the patient being generally deprived of motion and sensation. Sometimes, however, upon being called to loudly, he opens his eyes, but immediately shuts them, without answering any question; and occasionally when pinched he draws away the part, indicating remaining sensibility; the breathing is undisturbed or irregular, sometimes laboured, but without stertor: there is seldom much febrile heat, and the evacuations are passed without consciousness.

7. A. *Review of the chief symptoms.* — a. The pulse varies greatly in each of the above states of coma. It is generally slow, full, and soft; but it is also often small and quick in coma vigil, or in any of the varieties, when accompanying the last stages of fever; and small, hard, and sometimes irregular, in the coma attendant upon inflammatory action of the brain or its membranes. It is also frequently unequal, intermittent, and generally slow, but sometimes also quick, in the coma produced by injury of the brain, and by hæmorrhage or effusion of fluid within it. b. The respiration is often natural, as in coma vigil; sometimes accompanied by sighs, or laboured, as in coma profundum; frequently slow, and very seldom stertorous, unless in the coma of apoplexy. c. The pupils of the eyes are generally more or less dilated, and sluggish in their motions, or altogether insensible to light; but they are sometimes, in the most unfavourable cases, much contracted, or one contracted and the other dilated. d. The countenance is usually tumid, and without expression; sometimes pale or bloated, or red or injected; the eyes are prominent or suffused, and the head somewhat warmer than natural, or of the healthy temperature, the beat of the carotids being full or strong: in the coma consequent upon fever, and in coma vigil, the features are commonly pale, sunk, and cool; the action of the carotids being weak and soft in some cases, and hard and oppressed in others. e. The mental powers are commonly suppressed; but upon being momentarily excited, they sometimes appear more or less disordered, particularly in any of the states of coma supervening upon fever, or inflammation of the brain or its membranes; low delirium and febrile heat then being also present. f. The surface of the body is often natural, sometimes cold or clammy; but when the affection is caused by fever or inflammation,

\* I have, conformably with the received acceptance of lethargy in this country, made it the slightest form of soporose coma; although the ancients, our countryman WILLIS who has written ably on this affection, the greater number of writers of the sixteenth and seventeenth centuries, and many modern German authors, have defined it nearly as follows: — "profound sopor, or preternatural sleep, with fever and delirium;" thus applying the term to the more profound state of febrile coma.



the temperature may be somewhat elevated, and the skin dry. *g.* The *extremities* are frequently natural at first, but they are also often cold or clammy, or become so. *h.* The *position* is commonly supine, without attempts at motion, in profound coma; and, in the worst cases, the patient slips down in bed. *i.* The *tongue* is natural, or merely much loaded, in some instances; but in coma symptomatic of inflammation or fever, it is usually furred, dry, and brown, hard, and constricted. *k.* The *alvine excretions* are either retained, or passed without consciousness.

8. *B. Duration and termination.* — *a.* Any one of the forms of coma may be sudden in its *attack*, and terminate speedily in death; or it may come on gradually, and be of short duration, sense and voluntary motion as slowly returning. The seizure may be repeated frequently, or it may be periodic, particularly when attendant upon epilepsy, or remittent fever of a bad form. When its accession is slow, it often commences with drowsiness or headach. *b.* Its *duration* is very various; the lethargic and slighter varieties being occasionally of long continuance — sometimes lasting many weeks, and spontaneously passing off; the more profound states of coma frequently terminating fatally in a few hours, and seldom continuing longer than a very few days. *c.* It may *terminate* in either recovery or death, or in some other disease with which it is more or less closely related, as apoplexy, paralysis, insanity, or melancholia, epilepsy, and epileptic or other forms of convulsions with which it occasionally alternates; and in inflammation of the brain or its membranes.

9. *C. Diagnostic remarks.* — The states or grades of disease described above may pass one into the other, or into some other malady, whether they appear primarily or consecutively. They are often very nearly allied to, or rather are less degrees of, APOPLEXY; and apparently consist of a somewhat similar condition of the organic nervous power and vascular action within the brain, to that which obtains in a great proportion of the attacks of that disease (§ 62. *et seq.*), particularly those which do not immediately depend upon hæmorrhage. *a.* The close resemblance of many cases of coma vigil to *ecstasy*, and of the other states of coma to *cataplexy*, not only as to the grouping of the sensible phenomena which respectively constitute them, but also as to their presumed proximate causes, indicate that *cataplexy* and *cataleptic ecstasy* are merely unusual modifications of the state of cerebral disease now under consideration. *b.* The absence of stertor constitutes the chief difference between the most profound state of coma, *carus*, and *apoplexy*. *c.* The fulness and strength of the pulse, particularly in the carotids, and the natural or strong state of the respiration, are sufficient to distinguish coma from *syncope*, in which latter the action of the heart is greatly diminished primarily, the functions of the brain failing consecutively. *d.* Coma differs from *asphyxy* in the circumstance of the respiratory functions being first suppressed, and subsequently the action of the heart in the latter; the consequent coma arising from congestion of venous blood in the brain, produced by the abolished respiration, and obstructed circulation through the lungs and cavities of the heart.

10. II. OF PRIMARY OR IDIOPATHIC COMA. — Either of the varieties described above may occur as a primary affection arising from states of the organic nervous power and circulation within the brain, which will be noticed in the sequel (§ 13.), and which are commonly produced by the following agents: — *Causes.* — The continued or intense action of cold upon the nervous system and circulation; the influence of narcotics, particularly in some constitutions; indulgence in spirituous or intoxicating liquors, either carried too far or continued too long; venereal excesses; insolation; fatigue or prolonged watching; the influence of particular odours, condiments, or kinds of food, in some temperaments; inanition or exhaustion of vital power, by whatever cause, especially in the aged of the male sex; immoderate evacuations or discharges; mephitic or carbonaceous fumes or gases; sadness, anxiety, fright, terror, anger, and other violent mental affections; the inappropriate use of either warm or cold baths; the exhaustion of vital or nervous power by excessive or long continued pain; concussions and injuries of the brain; erratic, atonic, or retrocedent gout; pregnancy or child-bearing; and suppression of the menses or lochia; are the causes which produce, in a primary form, any of the states of coma described above.

11. III. SYMPTOMATIC COMA. — Either of the varieties of coma may supervene in the advanced course, more rarely on the invasion, of intermittent, remittent, or continued fevers, particularly typhus; of inflammations of the brain and its membranes; and of insanity and melancholia. Simple determinations of blood to, or congestion of, the encephalon will frequently be sufficient to induce the slighter states of coma; whilst its more severe or profound conditions are common consequences of effusions of blood or serum, and of numerous organic changes occurring within the head. (See BRAIN — *Organic Lesions of its Membranes and Substance*, § 21—84.). It is one of the most important symptoms that appear in the course of erysipelas of the face or head, and of exanthematous fevers; it may likewise supervene, particularly *coma vigil*, in the advanced stages of several acute maladies evincing exhaustion of the vital energy of the brain and nervous system, and in those in which the circulating fluid and secretions become vitiated or contaminated. The coma which is usually consecutive of epileptic or convulsive attacks consists of the slighter varieties denominated lethargic and somnolent, forming a part or consequence of these diseases. Coma is sometimes, also, a symptom of severe hysteria, particularly in plethoric persons with interrupted catamenial discharge; and, in rare instances, of worms, but by no means so frequently as stated by some writers. The occasional occurrence of any of the varieties of coma from suppression or retention of urine, from metastasis of gout and rheumatism, from the suppression of accustomed discharges, and more rarely from the retrocession of eruptions, and the drying up of old ulcers, should not be overlooked, particularly as such morbid relations require a peculiar and appropriate treatment.

12. IV. The PROGNOSIS in most cases of coma is unfavourable; for, although many will recover — even the great majority — the slighter cases will often present sudden changes. A much more



favourable opinion may be entertained of coma when it is produced by narcotics and spirituous liquors, than when it comes on in the course of febrile or malignant diseases, particularly after the absorption of morbid matters into the blood. The occurrence of epistaxis, of swellings of the parotids; the accession of the catamenia, or the hæmorrhoids; a fæculent diarrhœa; copious general perspiration; abundant discharge of urine depositing a sediment; erysipelas, eruptions, boils, gout, or rheumatism, appearing in external parts, particularly the lower extremities; and the return of sound natural sleep during a state of coma vigil, or typhomania; are very *favourable*—indeed, critical symptoms. The persistence of the affection; scanty secretion or retention of urine; subsultus; spastic contractions of one or more limbs; loss of speech, and total insensibility; distortion of the eyes; vomiting or retching; a previous breaking up of the constitution; pre-existing cachexy, and old age; bleeding from the ear, when it has been caused by external injury, as in concussion; constant supine posture, and slipping low down in the bed; coldness of the head, with sunk countenance, and cold clammy surface; loss of the faculty of deglutition, or return of matters put in the mouth; are very *unfavourable* signs.

13. V. PATHOLOGY.—A. Primary and symptomatic coma may be resolved into the following *pathological states*, either of which may exist singly, or in conjunction with one another:—1st, Exhaustion of the organic nervous influence supplying the brain, or torpor or suppression of it, inducing a state which may be called paralytic—a paralysis of all the cerebral functions: this condition is produced chiefly by directly or indirectly sedative causes, and by whatever depresses or exhausts the vital energy generally, or the nervous power in particular: it may be attended by anæmia of the brain; and then the coma will be preceded by, or accompanied with, convulsions, or alternate with them; but it is more frequently productive of some one of the states about to be noticed, especially congestion, and occasionally effusion within the head: it may go on to dissolution, or it may be followed by reaction and active congestion or acute inflammation; the comatose states sometimes observed at the invasion of dangerous forms of fever, and of certain apoplectic seizures, and the coma of the early stage of concussion of the brain, being of this description. 2d, Congestion of the capillaries, veins, or sinuses of the brain, is, perhaps, the most common morbid condition that obtains in coma, as respects the vascular system: but this state can scarcely arise, unless the organic nervous influence with which these vessels are supplied has been exhausted or depressed, excepting in those cases where the congestion proceeds from obstructed return of blood by the sinuses, or by the large veins coming from the head: in many cases, therefore, the existence of this state presupposes that first described, at least to some extent; and whether thus originating, or proceeding from impeded or obstructed return of blood, will equally occasion pressure of the organic nervous and cerebral tissues, and suppression of their functions: congestion of the blood-vessels within the head may, moreover, be associated with some other morbid states, as with contamination of the

circulating fluid; as in the coma that occurs in the advanced stage of typhus, and when morbid secretions are absorbed into the blood. 3d, Active determination of blood to the head will seldom occasion more than lethargy or coma vigil,—states which are frequently produced in this way in the advanced stages of various acute diseases, and sometimes by the use of anodynes, which, in some constitutions, disorder the nervous functions and excite the cerebral circulation. 4th, Inflammation of the brain or membranes, owing to the tumefaction consequent on it, &c., will often be accompanied with coma; and still more frequently terminate in it, as shown in the article on that disease: and, as we have seen that coma will thus proceed from very different or even opposite states of organic nervous power, and of vascular action, it becomes a matter of the utmost practical importance to distinguish them with accuracy: but not only may those pathological conditions exist in different cases, they may obtain at different stages of the same case: thus the coma of concussion, in which the first of those conditions exists, may successively pass into congestion and inflammatory action, forming the three stages which Mr. ABERNETHY has very accurately pointed out in concussion of the brain; coma, accompanied with very different symptoms, and modified in degree, being present throughout. 5th, The circulating fluid itself may be more or less changed; it either being of a darker colour, and in a less decarbonised state, than in health; or having entirely lost the power of coagulating, or presenting a coagulum of a weak or dissolved texture. (See BLOOD, § 94.) In addition to this state of the circulating fluid, congestion of the cerebral vessels and increased action of the heart may exist, as in the advanced stages of malignant, exanthematous, and febrile diseases; these associated lesions may be also preceded by, or coexistent with, depressed vital or organic nervous energy of the encephalon. 6th, Effusion of blood or serous fluid within the brain will give rise to profound coma, generally as a consequence of either the first, second, third, or fourth preceding states, occurring either primarily, or in the advanced progress of febrile diseases.

14. B. It must be evident, that a successful treatment of coma, under the numerous circumstances and diversified forms in which it presents itself in practice, must be based upon a recognition of the pathological states that occasion it. But how are these states to be ascertained? The difficulty even of an approximation to this knowledge is doubtless great; but the practical results, to which the information leads, are of the utmost importance, as respects both the issue, and the reputation of the physician. I shall therefore offer a few remarks, with the view of facilitating the investigation of this subject, and placing our intentions of cure upon a rational basis. a. In the *first* of the above pathological states, the pulse is weak, soft, unequal, or intermitting; the pulsation of the carotids is smaller, weaker, and softer than natural; the breathing is soft, slow, or laboured, but without stertor; the limbs and muscles are relaxed, and deprived of sensibility; the surface is pale, cool, moist or clammy, particularly the extremities; the head is cool, or at least not above, frequently below, the natural temperature; the countenance is pale or sunk;



he eyes open, without suffusion, and the pupils dilated; the tongue is soft, flabby, and broad, unless in the last stages of fever, when it is covered by a brown or dark fur; and the skin is dry or harsh. The feebleness and intermissions of the pulse, the depression of animal heat, and the loss of sensibility and voluntary motion, are generally in proportion to the exhaustion of vital power in the brain, and therefore important guides in the treatment of coma. *b.* The *second* pathological condition, or that of congestion, will vary in different cases, or even in different stages of the same case, from the depressed state of vascular action and animal heat, described above, to that now to be noticed. The pulse is oppressed, or full, slow, irregular, occasionally nearly natural,—in the carotids somewhat fuller, stronger, or more labouring, than in health, or in other parts where it can be felt; the respiration is either natural or slow, laborious or irregular; the countenance is slightly tumid, bloated, or livid; the eyes are somewhat suffused and prominent, the pupils dilated and insensible; the temperature of the head is occasionally natural, but more frequently slightly increased, and the face and scalp moist; the appearance of the tongue, as in the foregoing state, varies according as the coma is a primary or consecutive state of disease; the evacuations are either retained or passed insensibly; and sensibility, voluntary motion, and mental manifestation, are abolished in proportion to the extent of depression of the organic nervous influence of the brain, and of vascular congestion. This state may supervene on the former with more or less rapidity, and terminate either in *a* return to healthy action, or in the *third* and *fourth* states referred to. *c.* The *third* and *fourth* pathological states are different grades of vascular action, often arising out of the preceding: that consisting of active congestion or increased determination of blood through the cerebral vessels may present nearly the same symptoms as those characterising congestion, but in a much slighter degree; sensation and voluntary motion not being quite abolished; the coma being in its slighter grades,—as lethargy and coma vigil, very rarely coma somnulentum. The pulse and respiration may not be materially affected, or it may be merely accelerated; the temperature, even of the head, may also be natural, or but slightly increased, that of the extremities being depressed; the countenance may not be materially changed; in some cases it may be even sunk or depressed; but the carotids generally beat more fully and strongly than in health; and the mental manifestations are not merely more or less suppressed, but sometimes also disordered. The state of inflammatory action, and its consequences, give rise to phenomena of greater intensity than those now noticed, and which have been very fully described in another place. (See BRAIN, § 180.) *d.* The *fifth* state which I have referred to, as obtaining in some cases of coma, seldom occurs alone, but is associated with one or two of the preceding, particularly the *first*, *second*, or even the *third* conditions. It is characterised chiefly by a lurid, foul, dirty, or cachectic appearance of the surface; a sunk or sallow countenance; a frequent, soft, small, or broad and open pulse: by low delirium or typhomania; starting of the tendons, and picking of the bed-clothes; preceding

and associated febrile, exanthematous, or malignant diseases; and by foetor of the secretions and excretions. In some cases, when this state has come on rapidly, the tongue is merely broad, flabby, marked by the teeth at the edges, and covered by a creamy sordes; but in the last stage of acute diseases, it is deeply furred, or coated with a thick mucous sordes of a dark brown colour, often extending to the gums, and even to the lips. *e.* The *sixth* and *last* state, that of effusion, may be consequent upon any of the preceding, and be caused by one or more of them. If the effusion be sanguineous, the attack is often sudden; the respiration is generally stertorous, irregular, &c.; and signs of local paralysis may often be detected. (See APOPLEXY.) If serum be effused, the coma is as profound as that caused by sanguineous effusion; but slower in its accession, and less frequently attended by stertorous breathing, and local paralysis; it is also more commonly preceded by signs of inflammation, active determination, or congestion of blood, within the head. (See DROPSY OF THE ENCEPHALON.)

15. VI. TREATMENT.—The foregoing pathological states will often insensibly lapse into one another, as in concussion and inflammation of the brain, giving rise to distinct stages of these diseases, and requiring a different treatment for each; and, according as they may thus vary, so will their symptoms be modified; the principal phenomena connected with the cerebral functions, the pulse, the respiration, the animal temperature, the state of the head and carotids, &c. being the practitioner's guides in the direction and combination of his means of cure. These means will now require no further notice than a bare enumeration, as they are more fully discussed in the articles on the diseases in which coma, in one or other of its forms, most commonly presents itself.

16. *A.* The *first* pathological state (§ 13, 14. *a.*) requires stimulants and counter-irritants; but these remedies must be exhibited with much caution; as an excessive or inappropriate use of them might produce, even in the slighter cases of cerebral exhaustion, determination of blood to the head, and convert congestion into inflammation,—consequences which will frequently supervene, at least in a slight degree, as in concussion, notwithstanding the utmost care to avoid them. The preparations of ammonia, musk, and camphor, internally and externally employed; enemata, containing the same medicines, or the infusion of valerian, castor, assafoetida, or the terebinthinates; wine and cordials, given frequently and in small quantity; irritating or vesicating embrocations, cataplasms, sinapisms (CÆLIUS AURELIANUS, PAULUS ÆGINETA, to the head), and plasters, as well as moxas, and the cautery (ZACUTUS LUSITANUS, RHODIUS, and SEVERINUS) applied to various parts, or even to the head itself; blisters to the nape of the neck, behind the ears, or to the head (BONET, LANZANI, SYDENHAM); volatile substances held to the nostrils or applied to the temples; errhines (CÆLIUS AURELIANUS, &c.); urtication (ARETÆUS, SELTI); galvanism and electricity (HUFELAND, &c.); the affusion of warm, tepid, or, in some, cold water on the head; active and stimulating emetics (RIVIERE, RIGAL, &c.); purgatives combined with stimulants, antispasmodics, and tonics;



cathartic clysters, conjoined with similar substances; the use of coffee and green tea, particularly when this state of disease has followed the ingestion of sedative or narcotic poisons, and after the stomach has been evacuated by emetics and the stomach pump, and washed out by the injection of warm water; are severally of use in this state of coma, and may be resorted to in various combinations, according to the circumstances and severity of the case. All these measures are, however, not equally applicable to every case where this pathological state may be presumed to exist; but the judgment and experience of the practitioner can alone enable him to employ them in an appropriate manner; the shades of difference in particular cases requiring certain means, or peculiar combinations of them, scarcely admitting of description, at least within the limits to which I am necessarily confined.

17. B. The second pathological state (§ 13, 14. b.), when closely verging, as it occasionally does, upon the first, will require several of the means enumerated with respect to it; whilst, when fully formed, and approaching that of active determination or congestion, but few of them are applicable. Much, however, will manifestly depend upon the habits and the constitution of the patient; upon the nature and duration of the disease of which coma is an advanced phenomenon; and upon the state of the pulse, the temperature of the head, and the character of the countenance. The first state is injured by blood-letting in any form, it being even not an infrequent consequence of inanition, or even of anæmia of the brain; but this second state will generally be benefited by depletion, and in proportion to its approximation to the third and fourth states described above (§ 13, 14. c.). The question chiefly is as to what extent it may be carried, and the manner in which it may be performed. In the majority of cases, local depletions, by cupping between the shoulders and nape of the neck, or by leeches applied behind the ears or on the neck and occiput; by simple scarifications by a lancet in the last-named situation in some cases; in others bleeding from the feet whilst they are placed in warm water, and cold or tepid water is being poured in a stream upon the head; and in certain instances the application of a number of leeches on the inside tops of the thighs, or about the anus; are the preferable modes of having recourse to depletion in this state of disease; but the extent to which the evacuation should be carried must entirely depend upon the symptoms and circumstances of the case, and the effects produced by it. In addition to this important means, purgatives ought to be given by the mouth, and their action increased by cathartic clysters, in which either assafoetida, valerian, camphor, the terebinthines, or other antispasmodics and stimulants, may be also exhibited. Counter-irritants and derivatives should be applied, but at a distance from the head; and, while a frequent operation of the bowels is procured, the functions of the skin and kidneys should be promoted by diaphoretics and diuretics, the extremities being kept warm, the head cool, its hair cut off, and the shoulders highly elevated. In many instances of this state, even local depletion should be cautiously employed; and in these, as well as in others, much advantage

will often accrue from having recourse to restorative means. It is in this pathological condition of coma, and in those about to be noticed, that oil of turpentine, in large doses, so as to act freely on the bowels, has proved so beneficial in my practice. This state very generally obtains in coma from narcotics and spirituous liquors; and is then, especially, very remarkably benefited by the cold affusion on the head, and the preparations of ammonia.

18. C. The third and fourth states (§ 13, 14. c.) require nearly the same treatment as the second, but carried much further; general and local depletion, cold affusion on the head, or the application of ice, or evaporating lotions; the most active cathartics, clysters, and derivants or counter-irritants, and the other measures, as fully pointed out in the article on *Inflammation of the Brain* (§ 174.). When these states have gone on to effusion either of blood or of serum,—the sixth pathological condition adduced,—the treatment recommended in *Apoplexy* and in *Dropsy of the Encephalon* (see these articles) should be employed.

19. D. The fifth pathological state obviously requires stimulants, tonics, and antiseptics, particularly camphor in considerable doses; the chlorides of soda, potash, &c.; wine, with cordials, spices, &c.; bark, with camphor; purgatives conjoined with stimulants, so as to excite the eliminating or depuratory functions; cathartic, tonic, and antiseptic clysters; calomel, combined with camphor and ammonia, or musk; the turpentine given by the mouth, and in enemata, with capsicum and aromatics; external derivation and counter-irritation; the various balsams, with the chlorides, &c.; quinine, with the aromatic sulphuric acid; the preparations of cinchona or cascarilla with soda, or with the muriatic acid, or muriatic æther; Cayenne pepper internally, as well as externally in camphorated embrocations, &c. When coma is consequent upon the retrocession of gout, rheumatism, erysipelas, or cutaneous eruptions, the propriety of having recourse to sinapisms, rubefacient pediluvia, and other derivatives, in addition to such other means as the symptoms of the case may suggest, must be obvious. If it follow suppressed discharges, we should endeavour to restore these, or produce one supplemental of them. (See the treatment of the diseases of which coma is most frequently an important symptom.)

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CONCRETIONS, BILIARY.—*SYN.* *Calculi* or *Lapilli Cystici*; *Calculi Fellei*; *C. Biliares*; *C. Biliarii*; *Cholelithi*; *Hepatalgia Calculosa*; *Var. Auct. Concrementa Biliaria*, *Soemmerring. Chololithus*, *Good. Calculi Biliares*, *Fr. Die Gallenstein*, *Ger. Gall-stones.*

CLASSIF. 1. *Class*, *Coeliaca*; 2. *Order*, *Splanchnica*, *Gen. iii. (Good)*. I. *CLASS*, II. *ORDER (Author)*.

1. *DEFIN.* *Concretions formed in the bile-passages, and occasioning in many instances more or less disturbance, with paroxysms of pain commonly referred to the right epigastrium and hypochondrium, reaching to the back, &c., with increased suffering whilst passing into the alimentary canal, and often giving rise to sickness or vomiting, to jaundice, and severe attacks of colic.*

2. Biliary concretions were first noticed by *BENEVENIUS*, *FALLOPIUS*, *VESALIUS*, *KENTMANN*, and *FERNELIUS*, who were nearly contemporaries. They were afterwards more accurately described by *GLISSON*, *HOFFMANN*, *MORGAGNI*, *BIANCHI*, *BOERHAAVE*, *VAN SWIETEN*, and particularly by *HALLER*; and the more recent researches of *HEBERDEN*, *SOEMMERRING*, *THOMSON*, *THENARD*, *BOSTOCK*, *MÉRAT*, and *CHEVREUL*, have greatly advanced our knowledge of their nature and pathological relations. Notwithstanding the frequency of these concretions, and the very serious symptoms they occasion, but little attention has been paid to them by practical writers since the appearance of *SOEMMERRING'S Treatise*; and they have been nearly overlooked by the majority of systematic writers. *HALLER* remarks (what every pathologist will acknowledge), that they are infinitely more frequently found in post mortem researches than calculi of the urinary passages; and *HEBERDEN* agrees with him in admitting that, while urinary calculi are much more common in the male, biliary concretions are most frequent in the female sex—probably in the proportion of one in the former, to four or five in the latter.

3. 1. *DESCRIPTION.*—Biliary concretions vary remarkably as to form, size, number, and colour, as well as composition. *a.* They may exist in any number—from one to a thousand, or even more. *MORGAGNI*, *WALTER*, and *BAILLIE*, have found the latter number; and *SOEMMERRING*, with many of the authors referred to at the end of the article, have observed from fifty to several hundreds, and even upwards, either in the gall-bladder, or in the ramifications of the hepatic ducts. When thus numerous, they are usually very small—the size of pin-heads, or but little larger—of a dark brown, green, or greenish yellow colour, sometimes almost filling the gall-bladder, and occasionally slightly agglutinated by thick bile. More frequently, however, a small number, or two, three, or four are detected, and very

often only one. When only two or three are found, they sometimes are jointed into each other, or have their opposite surfaces smooth or flat. In rare instances they seem divided by a septum. *b.* When one, two, or three only exist, they are usually large, but they seldom reach the size of a hen's egg, or are much larger than a walnut. *Dr. SAUNDERS*, however, has found one of the bulk and figure of the gall-bladder, which it filled. They are not infrequently as large as a pigeon's egg, or as a hazel nut; and are often found from that size downwards. *c.* Their colour varies through every shade of black, green, brown, yellow, white, &c., that of the surface often differing from the centres and certain of their layers. They are often beautifully mottled or marbled; sometimes white and shining like spermaceti; at other times dull like wax; occasionally lamellated; often crystallised or striated, either with or without distinct centres, which are frequently different in colour and composition from the portions crystallised or collected around them. They are also more or less opaque, or slightly translucent. *d.* Their form varies from a round, oval, or oblong—when they are solitary—to a cone, a cube, pentagon, polygon, &c., when more numerous. They are usually smooth, sometimes polished, particularly the surfaces that have been in contact with each other; more rarely rough or glabrous, and occasionally they appear as broken into fragments. *e.* Their consistence also varies from what is barely sufficient to preserve their form, to that which does not yield to the pressure of the finger, and is divided by a knife with difficulty. *f.* Their specific gravity is much more frequently below, than above, that of water; consequently, they are commonly found swimming on the surface of water when the evacuations are mixed with it.

4. *Situation and Composition.*—Biliary concretions have been found in every part of the biliary passages:—1st, In the radicles of the hepatic ducts; 2d, In the hepatic duct, and its ramifications; 3d, In the cystic duct; 4th, In the gall-bladder; and, 5th, In the common duct. They have been likewise found in every part of the intestines, in their passage out of the body; and, in rare instances, in the stomach, whence they have been observed to have been ejected by vomiting. These concretions are often the result of obstruction to the course of the bile; and are then generally found to consist of an admixture of inspissated bile with mucus. But more frequently they are a consequence of an alteration of this fluid from its healthy constitution, as respects either the presence of elements foreign to it, or the superabundance of those which are the least soluble, and which are precipitated during the retention or accumulation of bile in the ducts and gall-bladder; the latter being most commonly the case. Of this description are the concretions formed of a crystallisable fatty matter described by *POULLETIER DE LA SALLE* and *FOURCROY*, under the name of adipocire, afterwards by *MARCEY*, *BOSTOCK*, &c., and named *cholesterine* by *CHEVREUL*. Some biliary calculi consist almost entirely of this substance. Others are formed of mucus and the thickened yellow matter, or the resin, of bile; and many are composed of *cholesterine*, the yellow matter, and the resin. Instances



of concretions different from these in composition have been noticed by MARCET, ORFILA, and CAVENTOU, but they are very rare. The greater part of these that consist of cholesterine have inspissated bile for nuclei, which, having passed along the hepatic ducts into the gall-bladder, form the centres around which the cholesterine crystallises. All these are soluble in warm alcohol, which deposits the solution in brilliant crystallised plates when cold; also in spirit of turpentine, and in the æthers, or in an admixture of turpentine and æther, leaving more or less of a residuum, according to the quantity of mucus or animal matter they contain. They also form a soapy solution in the caustic alkalies, melt at a high temperature, are inflammable, and insoluble in water.

5. The formation of biliary concretions in the radicles of the bile-ducts has been disputed; but M. CRUVEILHIER has given a very fine illustration of this rare occurrence in his excellent pathological work. When found in this situation, they generally consist of very small grains, of variable size and form, and of a dark green colour, disseminated through the healthy structure of the liver, and are formed chiefly of inspissated bile. Biliary concretions are most commonly found in the gall-bladder, and are usually the consequence of the remora or accumulation of bile; the absorption that takes place of its watery parts during its retention probably occasioning the precipitation or concretion of such of its more solid ingredients as it can no longer hold in solution or in suspension. SOEMMERRING, however, supposes that they form very rapidly, without any absorption or inspissation of the retained secretion; and this is probably more frequently the case, particularly in respect of those consisting chiefly of cholesterine, and when irritation of the internal surface of the gall bladder produces a morbid secretion, which may combine with the less soluble ingredients of bile, or dispose them to crystallise, particularly when they are secreted in larger quantity than natural, owing to a defect of the assimilating functions, and consequent accumulations of the elements of a morbid biliary secretion in the blood.

6. II. SYMPTOMS.—Calculi in the gall-bladder seldom give rise to any marked or definite symptom unless they are very large, obstruct the outlet of this receptacle, or excite inflammation of its mucous surface. Every experienced practitioner must have met with cases in which these concretions have been evacuated, and others also in which the gall-bladder has been found, after death, filled with them, without any ailment referrible to this organ having been complained of. The symptoms, therefore, usually stated to proceed from concretions in the gall-bladder should be viewed with limitations, inasmuch as they are not necessarily consequent upon their actual presence in it, and as they may proceed from some other pathological states. But, whilst we should view these symptoms with caution, we ought not to reject them; for, although concretions may form, and even pass into the alimentary canal, without creating much disturbance, or giving rise to any symptom distinctive of the existing derangement, yet not infrequently their presence, particularly their passage from the gall-bladder into the intestines, occasions such a train

of morbid phenomena, as will often enable the observing practitioner to form a correct diagnosis.

7. *A. Of calculi in the gall-bladder.*—Patients with biliary calculi often complain of a sense of weight and oppression at the epigastrium, and right hypochondrium, with cardialgia and various dyspeptic symptoms, especially after a meal, with constipation or slight irregularity of the bowels, an occasional deficiency of bile in the evacuations, and sallow or yellowish tint of the countenance and skin. In some cases a dull pain in the epigastrium, with a tympanitic fulness, is felt (STRACK); and in lean persons, a distinct tumour below the anterior margin of the right ribs may occasionally be detected, particularly when signs of obstructed excretion of bile have previously existed, indicating its accumulation in the gall-bladder. These may be all the symptoms, and often so slight as not particularly to interest the patient; they may, even when most evident, continue a longer or shorter time, until, at last, the pain and uneasiness increase,—especially when the patient turns, or lies upon the left side, uses exertion, rises quickly to the erect posture, takes a full inspiration, or soon after a meal,—and extend to the right hypochondrium, to the back or right shoulder-blade, sometimes to the right breast, shoulder, arm, and side of the neck, and even throughout the abdomen, particularly to the right flank and hip.

8. *B. The symptoms indicating the passage of concretions into the intestines* may not differ materially from the above, excepting in their severity and duration; and they often have little relation to the size of the calculus. When the concretions still remain in the gall-bladder, they occasion either little or no disturbance, or such as has been now described, in a more or less continued form. But when they are passing along the ducts, the symptoms are often very sudden in their invasion, of much greater intensity, of shorter duration, and generally recur in paroxysms. The pain is then frequently very acute, is attended by nausea, flatulence, or vomiting, by a bitter taste in the mouth, acid or bitter eructations, irregularity of bowels, colic, or distension of the abdomen, &c., and is followed by either a complete jaundice, or a slight yellow tint about the eyes or lips, the cheeks being clear. This discolouration commonly passes off soon after the paroxysms of suffering, which often come on about two hours after a full meal, and it either recurs along with, or follows closely upon, them; but it is not, nor, indeed, any of the symptoms enumerated, constantly observed, as COE, J. P. FRANK, and others, have demonstrated, and as every experienced practitioner must have remarked, even when large concretions have found their way into the bowels. The pulse is generally unaffected, and there is no fever, unless in the more violent seizures, or after their frequent recurrence or long duration; when, in addition to these symptoms, loss of flesh and strength, a furred, loaded, dark yellowish tongue, great restlessness, anxiety, and tenderness at the epigastrium, and right hypochondrium, are observed. The intervals between the attacks are extremely variable. Sometimes the paroxysms are periodic; and are evidently owing, on these, as well as on other occasions, either to some change in the position of the concretions, or their passage into the intestines,



or to inflammation produced by them in the gall-bladder and ducts. In many instances they are most excruciating; the patient is bent double, rolls about in great agony and anxiety, or presses upon the epigastrium, and complains of an acute or lacerating pain in the region of the ducts and duodenum, either with leipothyma or syncope; or with retching, distension of the abdomen, and severe colic. Females—who are most subject to these seizures—sometimes experience more suffering from them, than from parturition; and even in them the pulse may not be affected. The bowels are more frequently constipated than relaxed, and the motions are often devoid of bile, although diarrhoea be present. The most acute attacks may terminate as suddenly as they commenced, the patient soon recovering his strength and functions, unless more calculi remain to be passed. They are usually of short duration—not exceeding a few hours; but they become longer after their repetition, sometimes at last continuing several days, with partial remissions. Occasionally they are preceded by a sensation of something unusual, or alive, in the region of the stomach, or in various parts of the abdomen; and attended by dryness or slight pain of the throat, thirst; inability to straighten the trunk, or to keep it erect; by scanty, orange, or high coloured urine, and slight strangury.

9. *C. The affections and lesions sometimes caused by biliary concretions* attach to themselves much interest. In some cases, violent convulsive motions come on, from the pain and irritation they occasion, either with or without vertigo, headach, and cerebral congestion. Mental depression, obstinate dyspepsia, hypochondriasis, and melancholia; also flatulent and colicky states of the bowels, constipation, and diarrhoea; are not only frequent attendants upon, but also consequences of, biliary concretions. The less common disorders they occasion are, dyspnoea, syncope; slow remittent states of fever, hæmorrhoids, suppression of the catamenia, and apoplexy (BURSERI). The effects produced by them upon the gall-bladder and ducts are often most important; inflammation, thickening of their coats, ulceration, great dilatation of the ducts, adhesion of them, or of the gall-bladder, to the duodenum, or of the latter to the stomach, liver, or colon, or even to the parietes of the abdomen, with ulceration, and passage of the calculus into any of these parts of the digestive canal, or through an external opening at the right epigastrium, having been observed by several eminent authorities. COLOMBUS states, that, upon the examination of the body of the celebrated IGNATIUS LOYOLA, a biliary calculus was found to have ulcerated its way through the gall-bladder, into the trunk of the vena porta. CHESLDEN mentions a case in which two large calculi made their way, by inflammation and ulceration, through the abdominal parietes; and similar instances are recorded by HOFFMANN and CRELL, in one of which about eighty small calculi passed out through a sinuous ulceration below the right ribs. TOLET states a case in which a biliary concretion of the size of a pigeon's egg was discharged from an ulceration at the umbilicus; and BUETTNER saw thirty-eight calculi discharged in the same situation. SCHURIG mentions an instance of two such concretions having been taken from an abscess in the anterior ab-

dominal parietes, opened by FABRICIUS; and cases have been recorded by BLOCK, HALLER, WINCKEL, DIXON, CALLOWAY, and BAFFOS, of tumours having formed below the cartilages of the right false ribs, followed by inflammation, ulceration, and the discharge of biliary calculi of various sizes. SOEMMERRING states, that he has a preparation of a gall-bladder filled with concretions, and having an ulcer at its fundus, through which one of them had escaped. J. P. FRANK found, in the body of a woman who died during the puerperal state, the gall-bladder ruptured, and containing calculi, to which he attributes the rupture; and he met with another case in which the calculi had occasioned abscess and rupture of this viscus. Mr. BRAYNE has detailed an interesting case, in which adhesion of the gall-bladder to the duodenum had occurred, and in the centre of this adhesion an ulceration into the intestine had taken place, through which a very large calculus had passed, and been discharged by stool, a considerable period before the death of the patient; and similar instances are alluded to by Dr. SAUNDERS, as having been observed by Dr. CHESTON and Mr. CLINE. It is not improbable, that in some of the instances on record, in which biliary concretions have been voided by vomiting, adhesions of the gall-bladder to the stomach had taken place, and the concretion had made its way by ulceration at the place of adhesion into this viscus, from whence it had been ejected. A reference to the cases recorded by SCHURIG, ORTESCH, and BRONDI, in which biliary concretions had been evacuated from the stomach, will show that this is not an unreasonable inference.

10. Besides the usual appearances produced by inflammatory action in the coats of the gall-bladder, viz. adhesion to adjoining parts, thickening, ulceration, &c., they have been found almost or altogether destroyed by suppurative ulceration. In a case detailed by Dr. SCOTT, they were half an inch in thickness; and HALLER observed them destroyed by suppuration and ulceration—the calculus that had caused the inflammation lying in the midst of a disorganised and puriform matter. Obturation of the ducts has been often found on dissection, the gall-bladder being at the same time enormously distended by accumulated bile. In many cases, the ducts have been found very much dilated after the passage of large calculi through them. Such cases have been recorded by WALTER, DIETRICH, RICHTER, THOMAS, CRAIGIE, &c. HEISTER found the common duct dilated so as to admit his little finger. MORGAGNI states, that he has observed the same duct so wide that its diameter was nearly two fingers' breadth; and SOEMMERRING has preserved, in his museum, several specimens of great dilatation of this canal. RUYSCH and BLUMENBACH have found biliary concretions in the substance of the liver; and others that had perforated the cystic duct, and caused ulcerations of both the liver and duodenum. WALTER observed the ramifications of the hepatic duct, throughout nearly all the liver, enormously dilated, and filled with bile and some thousand small calculi; and CRUVEILHIER and myself have met with very great distension of all the ramifications of this duct, with thickening of its coats, and concretions mixed with viscid bile throughout their canals. It is obvious that concretions, either in



the hepatic ducts or in the gall-bladder, will sometimes give rise to very serious disease of the liver itself. A torpid state of this viscus, so frequently observed in connection with their formation, is rather their cause than their effect. Hence obstruction of the liver, and its consequences, particularly dropsy in some one of the shut cavities, or the cellular tissue, are of more frequent occurrence than inflammation of this organ; but, nevertheless, both acute hepatitis and abscess of the liver have been sometimes met with, owing to biliary concretions.

11. *D.* When biliary concretions, particularly those of a large size, have passed into the intestinal canal, they often give rise to very severe and even dangerous symptoms. Cases have been referred to in the article *CÆCUM*, in which I had seen fatal results, consequent upon the passage of biliary calculi into the appendix of the cæcum, they having produced inflammation, ulceration, or gangrene of this process, and, consecutively, fatal peritonitis: and, in the case recorded by CIVADIER, where a biliary concretion had escaped by an ulceration in the right groin, it is very probable that it had passed out through the cæcum, by inducing inflammation and ulceration of this part. The more common consequences, however, are, thirst, constipation of the bowels, colicky pains, sometimes tenderness on pressure referred to a particular part of the abdomen, followed by tenesmus, alvine evacuations, and the passage of the calculus. When it is very large, the symptoms will be the same as enumerated with reference to *Intestinal CONCRETIONS*, or it will produce severe *COLIC* or *ILEUS*. Instances of fatal results, sometimes occurring very rapidly, from biliary calculi, have been adduced by several of the authors already named, as well as by BIANCHI and RICHTER; those of a slower progress have presented, with various organic lesions and dropsical effusions into the large cavities,—consequences which have sometimes not appeared until a remote period from the voiding of concretions.

12. *III. CAUSES.*—Biliary concretions occur much more frequently in the female than in the male sex, and during the decline of life, than at an early age. They are very rarely met with much before the prime of life, and still more rarely in children. Their generation is favoured by the phlegmatic, bilious, and melancholic temperaments; by the violent or depressing passions—particularly anger, sadness, anxiety, &c.; the use of spirits; by sedentary occupations, rich and full living; protracted sleep; by sitting with the body bent forwards after meals (HOFFMANN, VAN SWIETEN, COE); by chronic dyspepsia and costiveness; and by imperfect assimilation and corpulency. Torpid or disordered function of the liver and gall-bladder; inaction of the latter and of its ducts; and a vitiated secretion of the bile itself; are obviously connected with the production of these concretions. Several writers have supposed that they arise from a putrescent state of the bile retained in the gall-bladder; but, as GOLDWITZ and SOEMMERRING have shown, this change, even granting it to occur, would rather prevent than favour their production. Various writers, as LEAKE, suppose that they are formed from the inspissation of the bile in the gall-bladder, from absorption of its watery parts: but

this cannot be the only or even a principal cause, as we often find this secretion remarkably thickened from long retention in this receptacle, without such formations. The absorption can, therefore, only favour the occurrence of other changes in the bile, to which certain peculiarities in its composition strongly dispose it. The very small concretions which occur in the ramifications of the hepatic duct generally consist of inspissated bile and mucus; and these, as they pass into the trunk of this duct, or are carried into the gall-bladder, may become the nuclei around which the superabundant cholesterine in the bile collected in the gall-bladder or in the ducts may crystallise; the increased quantity of this fatty matter in the bile being the chief pathological condition connected with their formation. As far as my own observation has extended, these concretions have occurred in persons whose assimilating functions have been imperfect. That the liver performs an assimilating as well as a secreting office, has been shown by me in another work (see *Appendix to RICHERAND'S Physiology*, p. 580.); and when, either from torpid function of this organ, or from imperfect action of the other assimilating viscera, the chyle is not perfectly animalised, fatty matter abounds in the circulation, and is modified into cholesterine during its excretion by the liver—that portion of it which the watery parts of the bile cannot preserve in solution, crystallising into biliary concretions upon the occurrence of the circumstances favouring this change. The fact, that these concretions are most commonly met with in fat persons, in whom assimilation is defective, and at that period of life when it begins to flag,—imperfect assimilation causing the superabundance of fatty matter in the circulation, and its consequent deposition in the adipose tissue—seems a strong proof in favour of this opinion, which is further confirmed by the circumstance of my having observed the serum whitish or milky on two occasions on which blood was taken from persons with biliary calculi,—an appearance now demonstrated to arise from the superabundance of fatty matter in the serum (see *BLOOD*, § 104.). I need not occupy my limits with the various speculations, or opinions, entertained by authors respecting the remote as well as pathological causes of biliary concretions, particularly as the most of them have been found to be erroneous. Those who are curious respecting them, will find almost all of any consequence that has been adduced on the subject, in the references at the end of the article, and particularly in the works of COE and SOEMMERRING.

13. *IV.* The *DIAGNOSIS* and *PROGNOSIS* can only be inferred from the entire history and contingent circumstances of the case; as there are no symptoms, which, from their constant presence, or relation to certain pathological conditions, will of themselves enable the practitioner to form a correct judgment as to the precise nature or result of the disease: and yet the experienced and observing will very generally draw tolerably correct conclusions as to both, from reasoning on the procession, relation, or grouping, of the symptoms present: and, although the disease is not frequently fatal, he will often have reason to be cautious in hazarding an opinion as to the ultimate or remote result; especially as the same morbid condition of the system that



gives rise to these concretions, often occasions other dangerous maladies, even although the concretions themselves do not produce any fatal lesion, or even serious disorder.

14. V. TREATMENT.—The measures required in cases where the concretions are presumed to be in the gall-bladder, are somewhat different from those, which their passage along the ducts usually demands. 1st. When the symptoms lead us to suspect the presence of concretions in the gall-bladder, the medicines recommended by SOEEMMERRING may be prescribed in various states of combination. These consist of the sub-carbonates of the fixed alkalies, the muriate of ammonia, the acetate of potass, the spiritus ætheris nitrici, the liquor potassæ, Castile soap, the extracts or decoctions of taraxacum, herba saponaria, the fumaria, &c. It is obvious that deobstruent aperients, and the above medicines, will often have much influence in improving the biliary secretion, and promoting its discharge into the duodenum, particularly when the patient takes regular exercise in the open air, and saline mineral waters. The remedy of DURANDE, consisting of three parts of the spiritus ætheris sulphur. comp., or the sulphuric æther, and two of rectified spirits of turpentine, given in doses of half a drachm to a drachm, has been much employed on the Continent; and, although it generally occasions unpleasant eructations, and sometimes increases the sickness, it has received the commendations of SOEEMMERRING and RICHTER, who advise it to be given after the exhibition of emollient, resolvent, and aperient remedies; and to be followed, particularly in cases where the passage of the concretions along the ducts is suspected, by the repeated use of gentle laxatives. I have prescribed the remedy of DURANDE in somewhat larger doses, and combined with it the tinct. of hyoscyamus, and certainly with marked benefit. Numerous French and German writers speak favourably of this medicine, while others fear its effects in cases where inflammatory action may exist. But my experience has proved that it will not aggravate such action, and far less give rise to it.

15. The *deobstruent* medicines that are most to be depended upon in this state of disease, are, the extract or decoction of taraxacum in large doses, with the alkalies (F. 77. 391.), the sub-carbonates, the acetates, or the sub-borates of the alkalies; or with soap, ammoniacum, blue pill, small doses of vini antimonii tartarizati, and the æthers (F. 397. 503—510. 837.). After these have been exhibited for some time, DURANDE's remedy may be taken on the surface of any fluid, or mixed in the yolk of an egg. Active purgatives or cathartics are upon the whole less beneficial than a frequent repetition of *laxatives*, or of such purgatives as are gentle and emollient in their operation; and even these, when exhibited early, are generally less successful than when deferred to a more advanced stage of the treatment. The oleum ricini, in doses of about one or two drachms, triturated with mucilage, or with the yolk of an egg, and repeated every five or six hours until it operates, manna, the oleum olivæ, the acetate of potass, &c., and warm milk whey, are the most appropriate laxatives. In many instances, a full dose of calomel, or five grains of blue pill, may precede their exhibition, as either of these

often proves beneficial, especially when combined with a full dose of hyoscyamus, and about a grain of camphor, and without any risk of those unpleasant effects imputed to it, or rather dreaded from it, by various Continental writers. The operation of *laxatives* should be promoted by the exhibition of oleaginous, saponaceous, and emollient *clysters*. As to the use of *emetics*, opposite opinions have been advanced. HOFFMANN, DURANDE, and FRANK very justly express themselves decidedly against them; and, indeed, BERTIN declares that he has met with cases, in which they caused rupture of the gall-bladder, its duct being obstructed by a calculus.

16. 2d. Those cases in which the symptoms indicate the passage of concretions into the bowels (§ 8.) require, in addition to the means above enumerated, warm anodyne fomentations; the belladonna plaster placed over the right hypochondrium; the exhibition either of this narcotic internally, or of the acetate of morphine, opium, or hyoscyamus; the remedy of DURANDE, or the combination of it with one or other of the medicines now mentioned. In some cases, an anodyne and discutient liniment (F. 297. 313.) may be placed over a warm poultice, and applied to the chief seat of pain. Local or general *depletion* is seldom of much service either in this or the preceding state of the disease, unless the existence of vascular plethora, or of tenderness of the hypochondrium and epigastrium, the state of the pulse, or habit of body, indicate it, when it should not be omitted. If tumour and tenderness of these regions, with other marks of inflammation of the gall-bladder and ducts, manifest themselves, general and local *blood-letting*, followed by poultices and fomentations, are requisite. In such cases, as well as in the more violent paroxysms of the malady, the treatment recommended by BRICHETEAU—of the success of which, in some very obstinate and intractable cases, he has adduced very striking proofs—may be put in practice. This consists of the application of a bladder, containing pieces of ice, over the seat of pain; of repeating it, as soon as the ice is dissolved, until relief is obtained; and of administering subsequently mild laxatives and clysters until the bowels are freely evacuated. MERAT had previously advised the injection of cold enemata; and DURANDE, of those which are tepid; but the cases adduced by BRICHETEAU seem conclusive of the superior efficacy of the means he has recommended. PETIT has contended for the propriety of making an early opening into such tumours at their more prominent part, with the view of evacuating the calculi, or the accumulated bile, which the gall-bladder cannot expel owing to occlusion of its duct. But the incertitude of adhesions having been formed between its fundus and the abdominal parietes, and of success even although they have actually taken place, must prevent every physician from directing the performance of this operation. In the majority of cases, the tumour will point outwardly, and either open spontaneously, or arrive at that stage which will warrant the artificial opening of it if the adhesion have formed. Even in three such cases, MORGAGNI found only one which healed up favourably; the other two long remaining in the state of fistulous ulcerations.—“Ergo non, nisi in adhesione vesiculæ felleæ ad integu-



menta abdominalia, tentenda exulceratio est, vel apertura artificiosa." (SOEEMMERRING.)

17. 3d. When the previous ailments and the existing symptoms indicate that the concretions have passed into the bowels, the use of gentle laxatives, as advised above, or the treatment directed with respect to *Intestinal CONCRETIONS*, and *COLIC*, is strictly appropriate. In some instances, when the calculi are large, they will give rise to much suffering referred to the cæcum, the sigmoid flexure of the colon, and to the rectum; they occasioning, in this last situation, constipation, colic, and urgent tenesmus. In these cases, the rectum should be carefully examined, and mechanical as well as medical means used to facilitate the passage of the concretion.

18. 4th. After the patient has been relieved, and, indeed, during the continuance of the treatment, the evacuations should be carefully examined, and mixed with water, with the view of detecting the concretions,—this being of much importance as respects not merely the diagnosis, but also the treatment. If we have reason, either from their presence in the motions, or from the disappearance of ailment, to presume that they have been evacuated, remedies ought to be prescribed with the view of improving the digestive, assimilating, and biliary functions. The use of taraxacum with soda, &c. (F. 76.392.); of gentle and deobstruent aperients; of vegetable bitters, with the alkaline preparations, and laxatives; regular exercise; light digestible food, and ripe fruits; a moderate use of lean but fresh meat; the strict avoidance of fatty substances and of spiritous liquors, of mental disquietude, and of all the exciting causes (§ 12.); should be enjoined, and the patient recommended change of air, the Cheltenham or Leamington mineral waters, and the artificial waters of Seidlitz, Scheidchütz, Eger, Pyrmont, Spa, and Carlsbad, according as they may be respectively appropriate to the circumstances of particular cases.

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## CONCRETIONS — INTESTINAL. SYN. —

*Alvine Concretions*; *Alvine Calculi*, Monro.  
*Calculous Concretions*, Andral. *Intestinal Calculi*; *Enterolithus*, Good.

CLASSIF. — I. CLASS, II. ORDER (Author, in Preface).

1. DEFIN. Substances accreted into solid masses in some part of the alimentary canal, chiefly owing to imperfect action of the digestive functions and nature of the ingesta, and giving rise to dangerous states of disease.

2. I. CALCULOUS CONCRETIONS occasionally form in various parts of the human alimentary canal; and, although generally the result of weak digestive function, hence, a consequence of disease, they are, in some cases, the chief cause of extreme suffering and danger. They are most commonly found in some part of the intestines, particularly the cæcum and large bowels; but they are sometimes also formed in the stomach, and there reach a very large size. *BONETUS*, in his *Sepulcretum Anatomicum*, relates two cases, in each of which a stone as large as a hen's egg, and weighing four ounces, was found in the stomach; and a third case, in which this viscus contained nine calculi weighing together three ounces and a half.

3. i. ORIGIN AND COMPOSITION. — Intestinal concretions are of several kinds, varying extremely in their nature and origin. In very rare instances they have assumed the appearance of bezoars, as in the case recorded by *MM. CHAMPION* and *BRACCONNOT*, who ascertained their nature by chemical analysis. In some cases, they consist chiefly of earthy deposits, in obscurely crystallised layers, around a distinct nucleus; in others, they are formed principally from those parts of the ingesta which are incapable of change during the digestive processes. The concretions which *Dr. Good* names intestinal calculi, and which consist chiefly of earthy deposits, are found in the human intestines, as well as in the alimentary canal of the larger ruminating animals. They are generally formed in concentric layers, and are often radiated, sometimes very obscurely, from nuclei, which are either gall-stones, or some hard foreign body. They are more or less porous, either spheroidal



or oblong, and vary from the size of a pea to that of a hen's egg; and sometimes reaching a much larger size.

4. With respect to their *origin*, they may be divided into three varieties: — 1st. Those which have arisen from nuclei formed either in the alimentary canal, or in the biliary apparatus, such as gall-stones, inspissated mucus, &c., around which certain saline and animal particles have attached themselves during their abode in the intestines. 2d. Those having nuclei consisting of foreign bodies, such as fruit-stones, seeds, or the husks of seeds, fragments of bones, &c., around which the alimentary particles have collected and crystallised, so that without the presence of the nucleus the calculus would not have been formed: and, 3d. Those which are formed entirely in the alimentary canal, and which are generally more or less homogeneous, and present no distinct nuclei.

5. The concretions of the *first* class have their nuclei or central part composed chiefly of cholesterine, the yellow colouring matter and the resin of the bile, surrounded by layers of a mixture of the phosphate of lime, and of the ammoniaco-magnesian phosphate, with animal matter. HALLER supposed that the saline constituents of these, and, indeed, all the other calculi, were furnished by the pancreatic juice; and that the resinous parts were derived from the bile. That such are the chief, although not the only, sources of these constituents respectively, will not, I think, be disputed.

6. Those belonging to the *second* class are nearly similar as respects their outer layers; their central parts varying according to the nature of the substance or substances forming their nuclei. This kind of intestinal calculi are not infrequent in those parts of Scotland where the inhabitants live chiefly upon oaten bread; the beard and fibres of the husks of the oat resisting digestion, and collecting together, so as to form concretions or nuclei, around which saline matter, with accessions of these fibres, collect. The external layers of the calculus formed from this source are generally solid, compact, soft to the touch, and composed of saline matter: in other instances, the outer layer has a velvety appearance, and consists of very fine fibres closely united. Dr. MARCET found these concretions to consist of compact layers of fibrous substances and of phosphates. The following is his analysis: — In 100 parts, 25·20 were animal matter; 3·90, resin; 5·16, ammoniaco-magnesian phosphate; 45·34, phosphate of lime; and 20·30, vegetable fibres. The vegetable fibres were cemented together by deposits of earthy matter, and the animal matter.

7. Some of those concretions very nearly approach those of the *third* class, and present no distinct nucleus, being merely an agglutinated mass of vegetable fibres with inspissated mucus and earthy phosphates, sometimes containing other foreign ingredients or accidental ingesta.

8. Other concretions are formed in the intestines of persons who have taken large quantities of magnesia or chalk, with the view of preserving an open state of the bowels, or of correcting acidity in the stomach. The concretions, in these cases, consist of those earthy bodies cemented together by thick mucus. These concretions are,

in some instances, merely agglomerated masses; in others, they are indistinctly disposed in layers: they seldom have any proper nucleus, and belong rather to this *third* class, than to any of the foregoing. To this division are also to be referred those concretions which are formed of fæcal matters with earthy phosphates, and inspissated secretions sometimes hardened to the consistence of calculi.

9. *Number, Size, Colour, &c.* — There are seldom more than two concretions in the intestinal canal, but a greater number is occasionally found. BONET met with nine in the stomach, LANZONI with ten, and BILGUER with thirty in this viscus. The first MONRO detected by the touch twelve concretions in the colon of a boy who was much emaciated; and various authors make mention of as great, as well as of a lower number. The *colour* of the smaller concretions nearly resembles that of iron ochre: the larger concretions are generally externally of a coffee colour, sometimes approaching to purple; and occasionally they have a whitish surface. The different layers often present a slight difference in the deepness of shade. They are sometimes so hard as to admit of an imperfect polish. Some of the calculi have been found extremely large. The first MONRO met with them five, six, seven, and even eight inches in circumference; and the second MONRO removed from the colon of a woman one which weighed four pounds. The larger calculi are generally more irregular in figure than the smaller. This may be owing to the additions made to their surface during the time they remain fixed within a certain portion of the canal. Where more than one are found, they often indent each other, or form, as it were, parts of one long concretion, as in the instance of the very large one, which weighed upwards of twelve ounces, and consisted of three parts, recorded by Mr. TORBET (*Edin. Med. and Surg. Jour.* vol. xxiv. p. 87.).

10. ii. The *CAUSES* of these *concretions* are, sedentary occupations, inactivity, and indolence; a slow, weak, and torpid state of all the digestive functions; deficient vital energy of the assimilating organs (§ 4, 5, 6.); a long, free, and injudicious use of magnesia, prepared chalk, and other calcareous earths, for the purpose of correcting acidity of the stomach (§ 7.), &c.; portions of the husk and beard of the oat, from living upon oaten bread, &c.; swallowing incautiously fragments of bones, stones of fruit, or seeds; and an habitual neglect of the state of the bowels.

11. iii. Their *LOCAL EFFECTS*. — When these concretions reach a large size, they interrupt the functions of the intestinal canal, preventing the passage of the fæces, and occasion dilatation of the bowel above the place in which they are lodged, followed by inflammation, ileus, &c. In more favourable cases, they expand the intestines surrounding them into a sac, which in process of time acquires considerable thickness. Dr. MONRO, in his very able chapter on alvine calculi, describes three cases in which the cæcum was extended into the form of a sac, the muscular fibres of which were hypertrophied, and the mucous membrane thickened and corrugated. This sac communicated with the commencement of the colon by a circular opening, which, in one case, was nearly an inch, in another scarcely



above a quarter of an inch, in diameter. A similar sacculated extension has been likewise noticed by this pathologist at the extremity of the ilium, near the cæcum.

12. Owing to the irritation occasioned by these concretions, the intestine is often found constricted around and immediately below them, as demonstrated by SCHENK and MONRO. Adhesion of the concretions to the inner coat of the viscus is a much rarer occurrence. Cases, however, have been observed by HORSTIUS and the first MONRO, where such adhesions existed. Ulceration of the parts in which they are lodged, owing to the irritation occasioned by them, is amongst the most common of the local effects to which they give rise. In some cases, the inflammation induced by them in the internal surface of the bowel extends to the external tunics, until it reaches the peritoneal surface, where coagulable lymph is thrown out, and the convolutions in its vicinity are agglutinated into one mass, or adhesions to adjoining parts take place.

13. iv. The SYMPTOMS which alvine concretions occasion vary extremely, according to their nature, and the size they have attained. Sometimes it seems wonderful, considering their great bulk, that the intestinal canal is not completely obstructed by them. In some cases, they have remained for years, with evident symptoms of their existence. In more fortunate instances, they have been ejected with the contents of the stomach after severe retching and vomiting; or have passed by stool, after severe dysenteric symptoms and tenesmus. In almost every instance, the digestive powers are very much impaired, and the patient becomes, after a time, greatly debilitated and emaciated. The pulse, at first, is but little affected; but the patient complains much of pain and tension in different parts of the intestines, and is subject to occasional attacks of nausea, vomiting, tormina, or purging. The pain in the bowels is usually referred to one part, and is much more severe at one time than at another, particularly after taking acids, or food difficult of digestion. Constipation of several days' duration is often complained of, and yet the patient has a constant inclination to go to stool: at other times, or in other cases, there are frequent watery and scanty evacuations of a viscid ropy mucus or blood, which sometimes give a short relief.

14. When the concretion is of a large size, and the patient is somewhat emaciated, a very hard, painful, globular tumour may be felt in the abdomen, most frequently in the course of the large bowels, upon placing him on his back, and relaxing the abdominal muscles. It can seldom be made to change its place within the intestine, but often appears to do so in consequence of the change of place of the portion of the intestine containing it, particularly when it is lodged in the small intestines, or in the arch of the colon. Some patients are under the necessity of abstaining from solid food, and others reject the greater part of their food. When the concretion has existed for some time, the bowels are generally so much obstructed that laxatives or clysters are necessary to procure a passage. Dr. MONRO states, that when it changes its place, and passes down into the sigmoid flexure of the colon, or into the rectum, it creates excru-

ciating torture in the region of the pelvis and fundament, and the bowels become obstinately constipated, and much distended, from the passage being interrupted.

15. When alvine concretions lodge low in the rectum, they occasion much pain when the patient is sitting, and upon going to stool. When this is the case, an examination *per anum* is requisite, which will lead to their extraction by the forceps. In a case in which the second MONRO was consulted by Mr. GOODSIR, the patient passed, in the course of two or three weeks, nine concretions in this way, some of which were as large as a hen's egg. This patient had laboured for many weeks under very acute pain in the region of the stomach.

16. When the concretions are small, they frequently pass away with the faecal matter, without occasioning any evident disturbance; the patients, generally, having complained of nothing further than long pre-existing dyspepsia and constipation—the chief causes of their formation. In other cases, especially when they reach a large size, most distressing and urgent symptoms are produced by them; commencing with those already enumerated (§ 13, 14.), and terminating with violent colicky pains, obstinate constipation, pain at the top of the sacrum and loins, or in the hypogastrium, sickness, retchings, and, at last, complete ileus, or all the phenomena of acute enteritis, or peritonitis. Even the smallest concretions occasionally give rise to fatal consequences. Two cases have occurred to me, wherein the most acute peritonitis, followed by the effusion of coagulable lymph, with adhesions, and terminating in sphacelus of the vermicular appendix of the cæcum, was occasioned by these concretions having passed into this part. A similar case is recorded by RUYSEN (*Museum*, 142.).

17. v. TREATMENT. — We are often without any satisfactory proof afforded us, during the life of the patient, of the existence of these concretions in the intestinal canal, the symptoms they occasion being the same with those proceeding from various other causes. Their existence is, therefore, often merely a matter of conjecture, to which the deficient energy of the digestive action, the means resorted to by the patient to palliate dyspeptic symptoms, and his accustomed diet, frequently lead; and we seldom can form any correct diagnosis, unless they are so large as to occasion tumours in the course of the bowels, or are lodged low in the rectum. When their existence is proved by their discharge, we may consider the mischief, in a great measure, if not entirely, removed, unless, indeed, the symptoms continue, when we may infer one of two causes, namely, the presence of more concretions, or the existence of inflammatory action induced by them in a portion of the intestines, or of intus-susception.

18. When the symptoms seem to proceed from the injudicious use of calcareous or magnesian absorbents, these must be entirely avoided. Aperients of a different nature should be employed, particularly the supersulphate of potash, or the sulphate of soda or of magnesia, with the addition of dilute sulphuric acid. In order to relieve the more urgent symptoms, copious injections of an oleaginous, emollient, and purgative kind, should be thrown up. And, in order that



these may more fully answer the intention, they ought to be administered whilst the patient rests upon his knees and elbows, with the pelvis elevated above the shoulders. If vomiting be present, care should be taken not to increase this symptom by the administration of medicines by the mouth. For, by frequently exciting the inverted action of the stomach, this action will extend to the alimentary canal, and terminate in fatal ileus. It is preferable to solicit the action of the bowels by emollient, anodyne, and aperient enemata, and by frictions with oleaginous substances, or fomentations on the abdomen. When we suspect the concretion is owing to the nature of the food, this cause must be avoided. When the concretions are seated low in the rectum, their extraction by the forceps must be tried. Those arising from the use of oat-bread being, generally, partly composed of the earthy phosphates, and considering the solubility of these salts, Mr. TORBET and Dr. DUNCAN conceive that an impression might be made on them by a course of mineral acids taken by the mouth, or injected by the anus.

19. The second MONRO recommends, in cases where the concretion is evident to the touch, forming a distinct and fixed tumour in the bowels, and where the symptoms are urgent, all other means having failed, to attempt its extraction by an incision through the abdominal parietes into the intestine; and in this recommendation Mr. TORBET and Dr. DUNCAN agree. But, before resorting to this last means, Dr. MONRO advises the following very judicious plan, which I extract from the very excellent materials which his son has laid before the profession:—"1st, Let the patient (a female) take every day a quarter of an ounce (?) of Castile soap, in pills, and of castor oil. 2d, Once or twice a week, let her take a purgative composed of sal glauberi, ʒj., sugar half an ounce, and the same of salad oil, and whey ℥ss., or ℥j. 3d, Three times a week let her get a clyster of a quart of water, in which an ounce of linseed and half an ounce of Castile soap have been infused for two hours. 4th, Let her foment the belly, and take the above clyster, when she suffers much pain. Let her diet consist of loaf-bread, milk, whey, broth, soft eggs, butter, a bit of light-dressed meat; and if she take porridge, let her melt a good deal of butter in it." (p. 50.) Such was the advice of a most experienced physician in this description of disease; and it proved successful in the case for which it was directed. (See also the *Treatment of COLIC and ILEUS, and of CONSTIPATION.*)

20. II. FATTY AND HETEROGENEOUS CONCRETIONS. — A. *Concrete substances*, differing very materially from those already described, are sometimes formed in the alimentary canal, particularly in the large intestines. These are usually derived from two principal sources, viz. a morbid state of the secretions poured into the intestinal tube, or secreted from their internal surface; and alterations of the usual state of the fæcal matters, during their retention in the cæcum and large bowels. To these, a third may be added,—the ingestion of substances into the stomach, which are incapable of undergoing any material change during their passage through the canal, excepting their agglutination into firm balls.

21. B. *Concretions of an oleaginous nature*, or

varying from an oleaginous to an *adipocirous* or even *waxy* character, are sometimes voided by persons who suffer from a torpid state of the bowels, and deficient digestive function. These concretions are often mistaken for gall-stones, but are readily distinguished from them by the following characters:—They are generally of a globular form, vary in size from that of a small pea to the bulk of a large grape, are of a cream colour, slightly translucent, and of sufficient consistence to preserve their form and be cut with a knife, like soft wax.

22. These unctuous concretions cannot in general be traced to any oleaginous material introduced into the stomach; yet there is sometimes evidence furnished of their origin in oleaginous or fatty substances which have not undergone the requisite changes in the prima via, but have been merely slightly changed by the acid existing in the stomach, and by the secretions poured into the alimentary canal, so as to assume the appearances now described. It is possible, however, that they may be occasionally formed by intestinal secretion, or by a chemical change effected on parts of the recrement of the food, after having passed into the cæcum and colon. Fat, either in the concrete form now described, or in a state of fluidity and purity resembling oil, has been occasionally, although rarely, voided from the bowels, independently of having been taken by the mouth; although more frequently proceeding from the latter source; as instances observed in the course of practice at the Institution for Children have proved. Cases of this description have been recorded by Dr. W. SCOTT (*Ed. Med. Comment.* vol. iv. p. 334.), Dr. BABINGTON and Dr. ELLIOTSON (*Philos. Trans.* 1813, art. xxi.), Dr. KUNTZMANZ, of Berlin (*Journ. der Pract. Heilkunde*, July, 1821.), DIETRICK, and several others.

23. Sir EVERARD HOME endeavours to account for the production of these adipocirous and fatty concretions, by contending that it is the office of the large intestines, particularly of the colon, to convert a considerable portion of the matters poured into them into fat, by combining them with the bile; and the fat thus formed in the large intestines is taken up and conveyed into the circulation, to be deposited in various parts of the body, to supply the wants of the economy. But the production of fat in the intestines seems to be only the result of a diseased action, inasmuch as it is voided from them, in any of its states, only during disease—during visceral complaints, and colicky or dysenteric affections—and is never observed to be passed from, nor is found within, these viscera, when they are in their healthy condition. It appears from the history of the cases on record, as well as from those recently observed by Dr. ELLIOTSON and Mr. LLOYD, to be especially connected with disease of the assimilating viscera, and consequently with imperfect assimilation; a portion of the chyle, instead of being changed to healthy blood, assuming an oleaginous state, as not infrequently observed in the serum. The fatty matter thus accumulated in the blood, will, in several states of disease, be eliminated from it by excreting organs—particularly by the mucous surface of the bowels, and by the liver and kidneys—instead of being deposited in the adipose tissue for ulterior purposes, and



will assume either a concrete or fluid form, owing to modifications of its state as originally secreted, or to the action of other matters upon it during its retention in the bowels or urinary bladder.

24. A singular case has been recorded by Dr. KENNEDY (*Medico-Chirurgical Journal for Sept. 1817.*), of an intestinal concretion, which was found, upon its analysis by Dr. URE, to be similar in its composition to ambergrise.

25. C. Intestinal concretions have been found to consist entirely of those matters which have been swallowed from either a depraved appetite, or bad habit; thus, concretions causing violent symptoms, have been produced by the habit of chewing the ends of threads used in sewing, and which have formed a firm felt with the mucus of the intestines and some fæcal matters. I was lately consulted in the case of a young lady who had been long under treatment for obscure abdominal disease, respecting the nature of which no two of the several eminent practitioners who had been in attendance agreed. The existence of accumulated matters in the cæcum and colon seemed evident to me, upon examination, and from the character of the constitutional and other symptoms. Purgatives and injections were long persisted in; at last several concretions—(about twelve)—from the size of a filbert to that of a walnut, were evacuated. Upon examination, they presented a substance resembling pasteboard, with a fæcal smell, of a brown colour, and containing earthy particles. On being broken down and macerated, they were found to consist chiefly of coarse paper reduced to a pulpy state, but containing fragments not materially altered. The portions of pulpy paper were agglutinated with mucus, portions of fæces, and a little phosphate of lime. After some time the patient confessed that she had occasionally been in the habit, about the age of thirteen and fourteen, of chewing, and sometimes swallowing, portions of the grey paper with which she curled her hair. After the evacuation of these concretions, all the symptoms disappeared, and she rapidly recovered. A few years ago, I attended, with Mr. ANNESLEY, a similar case to the foregoing, but in a younger lady. She recovered perfectly by the use of purgatives and clysters.

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CONGESTION OF BLOOD. CLASSIF. GENERAL PATHOLOGY: and I. CLASS, IV. ORDER (*Author*, in *Preface*).

1. DEFIN. *Deficient vital tone or power, chiefly of the capillary vessels and veins, occasioning accumulation of blood in them, and a languid or more or less retarded circulation, the functions of the*

*organ or part being thereby proportionately disordered.*

## 2. I. NATURE AND RELATIONS OF CONGESTION.

—It has been stated in other places (see arts. BLOOD, DISEASE.) that morbid states of the vascular system, and of the fluid circulating through it, must be imputed, in a large proportion of cases, to changes induced primarily in the organic nervous system, which is, anatomically, most intimately connected, not only with the circulating system, but also with the organs essentially vital; this connection subsisting by ramifications proceeding to them both directly and obviously either from the great central ganglion or from appropriate subordinate ganglia, as well as indirectly and less apparently through the medium of the blood-vessels, on which the organic nervous system is every where profusely distributed, the one accompanying the other throughout the frame. Thus intimately interwoven, they experience reciprocative changes, and generate a common influence. The vital organs, as well as their subordinate parts, in the more perfect animals, being supplied by both these systems,—the most rudimental type and essential requisites of organisation,—and actuated by their common influence, are thereby enabled to perform their destined functions; the superadded or peculiar organisation of each organ being the instrument, which, thus actuated, performs specific offices in the economy.

3. It results from this,—1st, that we are not justified in considering changes in the states of vascular action, or in the relation subsisting between the vessels and the quantity or quality of the fluids circulating in them, apart from the condition of the organic nervous system, which is thus intimately connected, by structure and function, both with them and with all vital organs; 2d, that changes in the vascular system are very often induced by impressions made primarily upon the organic nervous system; whilst, on the other hand, a morbid state of the former, particularly in respect of its circulating contents, will most seriously affect the latter; and 3d, that, upon tracing the procession of morbid phenomena, the first impression made by the exciting cause, and earliest change from the healthy state, will be found in the functions of this system of nerves, in perhaps the larger proportion of cases; vascular action, &c., and the secreting and assimilating functions, being very soon afterwards disordered. The truth of these propositions will become more manifest after having surveyed the causes which induce congestion, the phenomena which accompany it either as coincidences or consequences, and the results to which it leads; and we shall be more fully convinced of the propriety of viewing it as very much more frequently a link merely in the chain of morbid action, than as a primary or even an early change.

4. Congestion has been divided by many modern pathologists into *active* and *passive*, they understanding by the former that state of vascular action which coincides with *active determination of blood*, according to the meaning I have attached to it in another article. (See BLOOD, §25.) It may be defined to be a vital excitement with somewhat of expansion of the vessels, and the circulation of a larger quantity of blood through



them, without any obvious tendency to form new productions, or to occasion disorganisation, unless inflammation, or some other morbid condition, supervene, which is very often the case. From this state—*active congestion* (see BLOOD, § 26.)—in which the vital action of the vessels is above their healthy standard, there is every intermediate grade, lapsing insensibly into extreme *passive congestion*, in which there is deficient or depressed vital power, the current of the circulation through the weakened vessels being remarkably languid and retarded. In this state, the venous and arterial capillaries, having lost the principal part of their tone or vital tension, re-act imperfectly upon the mass of blood injected into them by the heart's action, and become distended and *congested*. This state, then, existing in any degree, down to that which is barely compatible with the continuance of the life of the part, constitutes congestion; it being thus considered as a state of sub-action, and not of super-action, as determination of blood undoubtedly is.

5. i. In respect of *the modes of accession* by which congestion presents itself, much diversity exists. It may occur suddenly, after intense causes; slowly, after slight influences or other disease; and almost insensibly, after active determinations of blood and inflammatory action. It may be almost the primary lesion, the impression made by the exciting cause upon the organic nerves being the only previous change; or it may be one of the most remote, and only antecedent of, or immediately consequent upon, dissolution. It is generally the result of directly or indirectly depressing causes; and assumes every grade according to the intensity of their operation relatively to the organic nervous or vital energies of the frame on which they act.

6. ii. *The textures most liable to undergo congestion* are such as, owing to their conformation, particularly the laxity of their vital and physical cohesion, admit of the distension of their vessels. Cellular parts, and organs in which the cellular structure predominates, as the parenchyma of various internal organs, particularly the brain, the lungs, the liver, spleen, and kidneys; the mucous membranes, especially those of the bronchi and digestive canal, and the uterus and ovaria; are most liable to experience this state of their blood-vessels. Besides these, however, other and less yielding structures, as the serous and fibrous membranes, the skin, the muscles, &c., may be congested to a certain extent, particularly after exhaustion of the vital energies of the frame, and diminution of the vital cohesion of these structures, either by causes which depress the organic nervous power, or by noxious agents contaminating the blood, or by over excitement of the vascular system of the congested part, or of the whole frame. In one or other of these three ways, congestion supervenes when it is observed at the commencement, in the course, or towards the close, of febrile and constitutional maladies; the same causes, and operating in a similar manner, also occasioning congestion of those viscera which are most liable to it by conformation.

7. iii. *The causes of congestion* are, therefore, 1st, those which act by primarily depressing the organic nervous influence; such as advanced age; the continued or prolonged impression of cold, mental anxiety, and all the depressing passions

and moral emotions; prolonged sleep, mental and physical inactivity; miasmatic, contagious, or infectious emanations; various vegetable, animal, and gaseous poisons; and the rapid loss of the natural electrical tension of the frame: 2d, those which mechanically impede the return or circulation of the blood itself, or which change its quantity and quality, either locally or generally; as excessive heat; general plethora, produced either by too full living, or by the suppression of the natural or accustomed discharges, interrupted circulation through the heart, the lungs, liver, &c.; a long retained posture by debilitated persons; the use of unnecessary ligatures and tight lacing; improper and unwholesome food; contamination of the blood, by the absorption or introduction into it of noxious mineral, vegetable, and animal substances, or gaseous fluids; and changes taking place in its constitution, from the interrupted secretion and elimination of hurtful matters from it (see BLOOD, § 115. *et seq.*)—these latter causes affecting the vital manifestation of the vessels and nervous systems: 3d, those causes which exhaust the irritability or vital tone of the vessels, by previously exciting them above their natural state of action; as local determinations of blood, general vascular excitement; fatigue from violent or continued exertion; pre-existing fever, inflammation, or other diseases. Thus it will be seen that congestion arises from changes induced (a) in the state of organic nervous power, and externally to the vessels; (b) in the blood itself, and acting internally on the vessels and structures; (c) in the coats of the vessels themselves; and (d) in two or more of these simultaneously.

8. iv. *The symptoms* indicating the existence of congestion are sometimes very apparent, at other times very obscure. When it is present in a marked degree, and in vital organs, the disturbance of function is usually so great as to indicate its existence; but even then the kind of disturbance may be very nearly the same as proceeds from morbid states, which we shall hereafter find congestion not infrequently occasions, viz. sanguineous or serous effusion; as in the cases of intense congestion of the encephalon. Upon the whole, however, it gives rise to partial loss, or entire abolition, of the functions of the affected part. Thus, congestion of the brain, when moderate, will occasion a slight state of lethargy, or vertigo, &c.; where more severe, epilepsy, coma, or apoplexy. Congestion of the liver is attended by more or less complete arrest of the biliary secretion, with tumefaction of the organ, &c.; and congestion of the bronchial surface and lungs, with dyspnoea, asthma, &c. Febrile phenomena seldom accompany congestion, unless it arise in the course, or towards the close, of febrile diseases, or be excited by infectious or miasmatic emanations, or is about to pass into an inflammatory or hæmorrhagic state. When it occurs in large secreting viscera or surfaces, the function of secretion is either impeded, vitiated, or altogether suspended; a return or increase of the secreting action either restoring the healthy state of circulation, or converting it into active determination, or even into inflammation. When congestion affects several parts, or two or more important viscera, as on the invasion or towards the close of malignant fevers, or when the circu-



lating fluid and soft solids become contaminated, the functions of the economy are very gravely disturbed, and some of them almost annihilated: in such cases, the morbid impression made by the existing causes upon the organic nervous system, disorders the various functions it actuates, and even puts a stop to some of them; the derangement of function being often a coeval and co-ordinate effect with the congestion. Hence the arrest or diminution of function becomes one of the most common indications of the extent of congestion, even although it may not be the actual consequence of this state of the vessels.

9. v. The *appearances presented by congested parts* after death vary extremely with their structure, and the degree and duration of the congestion. In addition to more or less engorgement of the small vessels and veins, there are generally found a darker colour of the contained fluid than in the natural state, considerable tumefaction, and diminished cohesion of the affected structure, and alteration of its colour. The change of colour may be of various grades of deepness, to a brownish or greenish black, as frequently observed in the liver and spleen; and the loss of vital cohesion may be very remarkable, as in the same viscera, tumefaction being then very considerable. These appearances are often accompanied with effusion of a serous, aqueous, or sanguineous fluid from the congested surfaces; and sometimes with ecchymoses of a deep colour in or beneath the mucous tissues, and occasionally in serous membranes and parenchymatous parts.

10. vi. The *general consequences and terminations* of congestion are deserving strict attention, as to this state are to be imputed several of those more grave and dangerous changes presented to us in the advanced stages of numerous diseases. 1st, Congestion terminates in the restoration of the healthy circulation. This is most frequently the case in respect of secreting parts, as the mucous and villous surfaces and glandular organs; the return of their secreting functions aiding most materially the restorative process, by diminishing the fulness of the vessels, and soliciting an accelerated circulation through them. Hence, although a restoration of the circulation, to some extent at least, is often antecedent of the return of the secreting function, yet we frequently succeed in restoring the former by exciting the latter; the stimulus thus imparted extending itself to the weakened and congested vessels. Parts which have once suffered congestion in a very marked degree, very often retain a disposition to experience it again, upon exposure to its causes; this disposition, however, diminishing with the lapse of time, if judicious means of strengthening the organ be adopted. 2d, Congestion may pass into active determination, or into inflammation of various grades of intensity. This may arise from changes induced in the state of the blood itself relatively to that of the vessels; or from the re-action of the vessels upon the distending fluid, and the augmented impulse following the temporary retardation of the circulating current; or from the use of irritating and inappropriate stimulants in order to remove the congestion; or from inordinate excitation of the secreting functions, when we endeavour in this way to remove oppletion of the vessels. 3d, Congestion frequently occasions serous or aqueous effusions in the

vicinity of the congested organ, or in the areolæ of its cellular tissue. We often observe this termination in the different internal viscera, and cavities in which they are situated. It evidently depends upon the rarefaction of structure occasioned by distension of the parietes, and loss of tone of the congested vessels, most probably assisted by weakened vital cohesion of the tissues, and diminished crasis of the blood; these conditions either accompanying or following the congested state, which very frequently is partially, or altogether removed by the consequent effusion. 4th, Hæmorrhage may supervene, either from the surface, or into the substance of the congested organ or part; owing either to a constitutional disposition to hæmorrhage, arising from original conformation, the vessels readily yielding from distension or accidental impulse; or to the existence in a more or less intense degree of the same changes which produce aqueous effusion, particularly weakened cohesion of the tissues, and, consequently, of the delicate canals conveying the blood through them, and a morbid state of the blood itself. 5th, Congestion of the minute capillary canals, either frequently recurring, or continuing long, seems to give rise to various morbid or adventitious structures, particularly when it takes place in persons of a scrofulous diathesis, or affected by any other constitutional taint. In such cases there is a marked indisposition, both of the part to return to a healthy state, and of the adventitious structure to be absorbed. 6th, Retardation of the circulation in congested vessels may be so complete as to occasion even loss of vitality and gangrene of the part. We observe this in the congestion arising from extreme cold, from the exhaustion consequent on intense excitement, &c.

11. vii. *Congestion, and its consequences in respect of particular structures*, are of great importance, and are therefore considered among the principal changes to which vital organs are subject. Although the local relations of congestion fall under their appropriate heads, it may be remarked, in general terms, that congestion may occur in any structure or organ during life, without evincing upon dissection unequivocal proofs of having ever existed; and that it may apparently continue till dissolution, without being very manifest upon examination afterwards. Such is especially the case in respect of congestion of mucous and serous surfaces, the vessels of which empty themselves soon after death, when the propelling power no longer acts upon them and distends their relaxed parietes, in consequence either of the passage of more or less of their contents into the adjoining veins, or of the escape, through the extreme canals and pores of these structures, of the more aqueous or serous parts of the blood they contained, or of both these changes conjoined. From this it will be manifest that many cases of recent or not very intense congestion, wherein we have reason to infer that the small vessels have not altogether lost their vital tone, particularly of membranous parts, will present upon dissection chiefly fulness of the veins, proceeding from these parts, with the effusion of more or less of a serous, aqueous, or sanguineous fluid in their vicinity. On the other hand, congestion of internal organs may not have been detected at all during life, or it may have occurred



but shortly before, or at the time of death, and yet be very evident upon inspection afterwards. This is not infrequently observed in respect of parenchymatous organs and mucous and villous surfaces. When congestion, however, occurs in the large viscera, as the brain, lungs, liver, and spleen, and continues up to the time of dissolution, it is generally very manifest in them upon dissection. In many diseases, particularly those in which the blood becomes affected previously to, or continues fluid after, death, and in those which terminate by asphyxy, congestion of depending parts is a very common *post mortem* occurrence, and one which should be carefully distinguished from the congestion that has existed during life.

## 12. II. OF THE TREATMENT OF CONGESTIONS.—

i. It is necessary always to keep in view the fact, that congestion is a consecutive lesion, arising generally from causes which depress the vital manifestation of the organic system of nerves supplying the blood-vessels; and that, although it is very frequently associated with general plethora, and necessarily implies the existence of local plethora (see BLOOD, § 23.), yet, on account of this depression of nervous power, *general depletion*, unless to a small amount, is seldom of much service in the treatment of congestion, unless it be conjoined with the use of stimulants, derivatives, and excitants of the secreting functions. *a.* But *local depletions*, particularly when directed in such a manner as to operate some degree of revulsion from the congested part, sometimes carried to a considerable extent, or repeated as circumstances require, are among the most requisite means of cure. *b.* When the powers of life are much reduced, even local depletions should be employed with caution, and never without having recourse, at the same time, or previously, to suitable *excitants* and *external derivatives*. Of these classes of remedies, the most preferable are such as tend to equalise the circulation throughout the viscera, and determine it to the periphery of the frame. *Diaphoretics*; the *warm* or *vapour-bath*; warm poultices and fomentations; *rubefacient embrocations*, epithems or poultices, especially those with Cayenne pepper, mustard, horseradish, &c.; *blisters*, and warm and rubefacient *pediluvia*; are calculated to accomplish these purposes. *c.* Much advantage will also accrue from attempting to restore, by *emetics*, *purgatives*, or other remedies, the secretions of the mucous surfaces, and the functions of the congested organ; as the restoration of these functions, which are generally impeded or altogether arrested, will unload the vessels, and accelerate the retarded circulation in them. But it should be kept in mind, that the medicines that operate in this manner are generally local and specific excitants; and hence that they, as well as the stimulants usually given internally, should be exhibited with caution, and preferably at the same time that local depletion, with *derivation* to the surface of the body and lower extremities, are being employed. Without attention to these precautions, we may convert, particularly in plethoric persons, simple congestion into active determination of blood, or into inflammation. *d.* The *diffusible stimulants* that are generally most serviceable in removing congestions are, camphor, the preparations of ammonia, the æthers, weak infu-

sions of arnica or serpentaria, warm diluents with saline medicines or the nitro-muriatic acids, the liquor ammoniæ acetatis, small doses of ipecacuanha, with camphor and opium, &c., and several of the gum-resins and essential oils. *e.* In many cases of congestion of vital organs, it will be requisite, in addition to the foregoing measures, to direct internal *revulsant agents* to remote viscera. Thus, in congestion of the head or lungs, we shall derive advantage from exciting the action of the lower bowels by *irritating cathartics* and injections; and, having prescribed depletions and external derivation, from a judicious employment of active *diuretics*. *f.* In all cases, it will be necessary to promote the natural secretions and excretions; inasmuch as we thereby keep up a regular distribution of the circulating fluids, and eliminate from them such hurtful substances as might irritate the vessels and induce consecutive disease, if they were allowed to accumulate. *g.* In many instances, benefit will accrue from the *affusion* or *aspersion of cold or tepid water* over the part enclosing the congested organ, especially when the state of the pulse, and the seat of congestion, lead us to dread the super-vention of hæmorrhage, as in congestion of the brain or of the lungs. *h.* Besides the external means already alluded to, various others may be employed near the seat of congestion; as *moxas*, the actual *cautery*, dry cupping, stimulating or rubefacient *liniments*, dry friction, the warm and tepid affusion or *douche*, the nitro-muriatic acid lotion, chlorine or fumigating baths, electricity or galvanism; but these are most appropriate to the more chronic states of congestion. There are other remedies besides the few now adduced, which are suitable to particular states and seats of congestion, and which fall under different heads.

13. ii. Having removed the congestion, it will be necessary to employ means to prevent its recurrence, for the part once thus affected long retains a morbid disposition. This object can be obtained only by a careful avoidance of the exciting causes—by preserving a free state of the secretions and excretions—by promoting the digestive functions, and invigorating the system by moderate exercise in the open air, either on foot or horseback—by the use of mineral waters, particularly those which combine a tonic with an aperient and deobstruent operation, as the waters of Cheltenham, Harrogate, Scarborough, Leamington, Seidschutz, Carlsbad, Bath, Marienbad, Vichy, and Eger—by warm clothing, and by guarding against general vascular plethora.

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**CONSTIPATION.**—**SYN.** *Constipatio vel Obstipatio Alvi*; *Alvus tarda, dura, adstricta*, Var. Auct. *Tarda Alvi Dejectio*, Vogel. *Obstipatio Alvina*, Young. *Stypsis* (from *στυφω*, I constrict) Ploucquet. *Coprostasis*, Good. *Hartleibigkeit*, Germ. *Constipation*, *Paresse du Ventre*, Fr. *Costipazione*, Ital. *Bound-Belly*, *Costiveness*, *Obstipation*, *Fæcal Retention*, *Alvine Obstruction*.

**CLASSIF.**—4. *Class*, Local Diseases; 5. *Order*, Obstructions (Cullen). 1. *Class*, Digestive Diseases; 1. *Order*, Affecting the Alimentary Canal (Good). I. **CLASS**, I. **ORDER** (Author).

1. **DEFIN.** *Prolonged retention of the fæces; or slow, imperfect, or difficult evacuation of them.*

2. Dr. Good has made *Coprostasis*, or *Costiveness*, a genus, and divided it into *C. Constipata*, and *C. Obstipata*; the chief difference being, that the evacuation is voluminous in the former, and scybalous or slender in the latter. This division is nearly the same as that previously adopted by Dr. BATEMAN, viz. into *Costiveness* and *Constipation*. I believe, however, that any distinction between them is quite unnecessary; inasmuch as either the one or the other, even according to the import these writers attach to them respectively, may arise from exactly the same pathological conditions; and that it will be better to employ these terms in their usual acceptance, and to make constipation an intermediate grade between costiveness and obstipation; or, if any other difference than that of degree be imputed to them, to consider obstipation as a modification merely of the others, by attaching to it the idea of difficult and imperfect voidance of the fæces, as well as of prolonged retention of them—which latter alone will apply to costiveness and constipation, according to the degree of obstinacy by which the retention may be characterised.

3. The slighter grade, or costiveness, can scarcely be considered as a disease in some constitutions, as it is often attended by a good state of health in other respects, and seldom continues so long as to occasion any appreciable disturbance. But, when neglected, it gives rise to those collections in, and morbid conditions of, the *colon*, which have been described in that article, and favours the occurrence of other maladies. Although cases are frequently occurring in which little disorder results from constipation, except from the means used to remove it, yet very serious or even fatal effects not infrequently accrue from it. I shall, therefore, adopt the opinion of CULLEN, and consider the retention of the fæces beyond twenty-four hours, without the desire of evacuation, as an approach to a morbid state, and therefore requiring medical aid.

4. *Duration, &c.*—The annals of medicine abound with cases in which the fæces had been retained for an almost incredible time, without any serious or severe symptom supervening. The occurrence of constipation for several days, or even weeks, is not rare, particularly in some constitutions, and in weak or delicate females, who take little nourishment, and as little exercise; and, excepting listlessness with debility, little disorder is complained of. It is not uncommon to meet with cases, especially in this sex, where extremely little food is taken, and

where the fæcal evacuations are not more frequent than once a week, or once a fortnight or three weeks; eliminations of effæte matters from the blood taking place chiefly by means of the skin, the surface of the lungs and kidneys, and generally in an insensible manner. But cases also more rarely occur, where the retention is much longer, even without any other symptom than great flatulent and fæcal distension, particularly of the colon, until, suddenly, symptoms of colic, ileus, or inflammation, come on, and soon terminate the life of the patient, or put it in extreme jeopardy. Instances have been adduced by RHODIUS, PANAROLUS, SALMUTH, DEVILLIERS, BLANKARD, ERHARD, MOSSMAN, &c., of constipation continuing for five, six, or seven weeks, and even for as many months, without any fæcal evacuation. Dr. BAILLIE published a case which continued for fifteen weeks; and JOERDENS met with cases of fourteen, fifteen, and twenty-one weeks. Instances of constipation continuing three, four, five, seven, eight, and nine months, have been detailed respectively by TRIEN, CHAPTAL, SMETIUS, STANILAND, POMMA, CRAMPTON, and VALENTIN. In many of those very prolonged cases, the appetite was very deficient; but in that adduced by Mr. STANILAND, which continued for seven months, the appetite continued good until inflammation, which rapidly terminated life, came on. This person, a young female, never had more than one evacuation every two months, during a period of five years; all which time she appeared otherwise in good health. Indeed, in some instances of less duration than those now alluded to, the appetite has been much greater than in health. I have met with several cases of habitual constipation, in which the patient had a ravenous appetite, and yet did not pass a fæcal evacuation oftener than once every four, six, eight, or ten days; but, in almost every such instance, either the breath has been loaded with an offensive vapour, or the perspiration has been abundant and disagreeable, or the urine copious and much loaded,—evidently proving that the disorder was connected with a rapid absorption from the alimentary canal, and augmented evacuation by the other excreting surfaces, or by the kidneys. The inordinate excretion that takes place by this latter emunctory, and the constipation, and ravenous appetite accompanying it, in diabetes, further shows that a very large proportion—sometimes nearly all—of the ingesta will sometimes be so far digested as to admit of their absorption, their subsequent discharge taking place almost exclusively by the skin, lungs, and kidneys; a proportionate diminution of the excreting functions of the bowels, and consequently of fæcal matters in them, being the result; that portion, however, which does collect, being retained until it excites them to action, either by the bulk or by the irritating properties it may have acquired, when also it may be the cause of a morbid or perverted action. The above circumstance shows (what, indeed, physiological research has proved), that, in healthy persons, the principal part of the fæcal discharges consists of secreted matters, and but a small portion of them of such parts of the food as have escaped the changes produced by digestion; and it proves the accuracy of the opinion entertained by CULLEN, at least as respects a



large number of such cases, viz. that costiveness arises, in great measure, from the absorption of the more fluid parts of the contents of the bowels, whether consisting of the digested aliments, or of the exhaled or secreted fluids poured into them.

5. I. CAUSES.—i. *Remote causes.* Habitual costiveness is most common in persons of the melancholic temperament, of a thin and robust habit of body, and of a rigid constitution of fibre; and is often connected with great activity of the absorbent function. The most prolonged cases of constipation usually occur in thin delicate females, and is obviously owing to an asthenic condition of the organic functions, particularly those more intimately connected with the alimentary canal. MECKEL states, that cretins are very generally constipated, partly owing to their inactive existence. It is very often caused by the use of indigestible food, as heavy, or imperfectly leavened, or adulterated bread, new cheese, nuts, cucumber, &c.; by stimulant and astringent aliments and beverages; by the use of narcotics; by smoking or taking snuff; travelling in carriages or on ship-board; by sedentary occupations; too long indulgence in sleep, and too warm beds; inattention to the first intimation to alvine evacuation; venereal excesses; prolonged lactation; excessive perspirations, or increased exhalation and secretion from other surfaces and parts than the intestinal canal; mental or physical exertions too long continued; advanced age; pregnancy; and the various mechanical and organic causes about to be noticed (§ 9. *et seq.*).

6. ii. The *immediate causes*, or *pathological states giving rise to the retention* and imperfect excretion of the fæces, appear to be the following:—1st, Impaired or *torpid functions* of the *duodenum* and *small intestine*. (See DUODENUM.) In this form of disorder, more or less obvious symptoms of indigestion are usually complained of from two to four hours after a meal, and it is often attended by a slow pulse, slight sallowness of the countenance and skin, with distension or uneasiness about the right hypochondrium, and, in some cases, with a dull pain in this situation, and unnatural heat of the palms of the hand and soles of the feet. The tongue is foul at the root, while the sides and point are red; the urine high-coloured, or depositing much sediment, and the pulse sometimes slower than natural; but occasionally quicker a few hours after a meal. 2d, *Torpid function* of the large bowels, affecting either the *cæcum*, *colon*, or *rectum*, in a more or less special manner. In this form of disorder, constipation is usually more prolonged than in the foregoing, and the sense of distension or uneasiness is referred to the situation of these viscera. There is also much flatulence, and all the symptoms more particularly noticed in the article on *Torpor of the Colon*.

7. Constipation may thus arise from an inactive state of any part of the alimentary canal, but it most frequently and immediately depends upon torpor of the portion devoted to the function of fæcation; and, although a part only of the digestive tube may be chiefly affected, yet disorder is seldom limited to it,—the functions of the adjoining portions, and, in many cases, of the whole canal, being impaired. It may be useful, also, to endeavour to estimate in what this disordered

function may consist, and whence it proceeds; and although nothing beyond conjecture will often be advanced, yet will our opinions very often be well founded, particularly after repeated observation, and the attempt will therefore become advantageous in practice. Impaired function, then, of any part, or even of the whole, of the intestinal canal, producing either habitual costiveness, or the occurrence of prolonged constipation may be owing to one or more of the following states:—*a.* To a diminished secretion, or modified condition of the biliary and pancreatic fluids; *b.* To lessened exhalation from the mucous coat of the intestines, and to impaired secretion from the follicular glands of this membrane; *c.* To a rapid absorption from the internal surface of the bowels; *d.* To relaxation, or torpor of the muscular coats of the intestines giving rise to distension, followed by imperfect or irregular re-action on the distending power, and consequent fæcal and flatulent accumulations, particularly in the large bowels; *e.* To rigidity of the longitudinal bands of the colon, forming this viscus into cells, and diminishing the calibre of the central canal, from each side of which the cells diverge,—thereby occasioning that state of constipation or obstipation, which is characterised by scybalous stools, and a difficult and imperfect evacuation of them; *f.* To the production and accumulation of flatus in the intestinal tube, which, by the distension and inaction of the coats it occasions, as well as by its mechanical effects in obstructing the passage of the fæces, and impacting them into masses, often proves no mean obstacle to the regular process of fæcation; *g.* To the accumulation of mucous sordes on the surface of the intestines, or the lodgment of hardened fæces in the cæcum, cells of the colon, or rectum; and, lastly, To a varied combination of two or more of the above states of function. All these may be resolved into, or referred to, one morbid condition, viz. impaired organic nervous power, or diminished vital manifestation of the digestive canal, expressed in one or more of the above modes, or occasioning these pathological conditions.

8. The above may constitute *primary* or *idiopathic* constipation, or intestinal indigestion; or, in other words, functional impairment of the defæcating process. But constipation is as frequently *consecutive* of lesions, either (*a*) of the structure of the coats of the bowels themselves, and affecting the calibre of their canal; (*b*) of adjoining parts, causing obstruction, compression, or displacement of them; (*c*) and it is also very often sympathetic of other diseases, which derive from them some portion of the vital action requisite to the regular performance of their functions. The last of these requires no further notice, as it resolves itself into the pathological states above enumerated; but it is very important that the practitioner should be enabled to recall to his recollection the various changes which not infrequently do occur, and give rise to the same state of disorder as the functional derangements above stated; as, upon a recognition of their presence or of their absence, the prognosis and treatment will very materially depend. The enumeration of these will also comprise all that has been found upon the dissection of such cases as have terminated fatally, fuller details respecting them



being given in other articles, particularly in that upon the *Organic Lesions of the Digestive Canal*.

9. *A. Lesions, chiefly of structure, affecting the bowels and retarding the defæcating processes.*—*a.* Extreme dilatation of one or all of the large bowels, sometimes independently of much fæcal accumulation; but most commonly accompanied with large collections of hardened fæces and gases (STORCK, BRENDÉL, CALLISEN, ABERCROMBIE, STANILAND, and many others). In cases of this description, the cæcum and colon have frequently been observed from twenty to thirty inches in circumference. *b.* Scybala, hard bodies, particularly biliary or intestinal concretions, the stones of fruit, &c., in various parts of the intestines, especially in the cæcum or before its valve, the sigmoid flexure of the colon, and in the rectum just above the sphincter, and pressing upon it and the prostate. Instances of prolonged constipation have occurred in my practice from the obstruction occasioned by large balls of lumbrici and ascarides. A singular case of this description was noticed by me in the *London Medical Repository* (vol. xvii. p. 243.), and similar effects have been mentioned by LIEUTAUD, BRERA, RENAULDIN, and BREMSER. *c.* Of inflammation of an insidious character, and sub-acute or chronic form, affecting chiefly the muscular or peritoneal coats of some part of the bowels, particularly of the small intestines; and either altogether arresting the peristaltic and tonic movements of that part, or greatly diminishing their activity. *d.* Contractions of various parts of the intestinal tube, but most frequently of the rectum, next of the colon, and least frequently of the cæcum and small intestines: these may be small in extent, although great in degree; or they may be the reverse. The narrowed part may be affected by spasm, or by thickening of one or more of its coats; this latter change being either so limited as to have the form of a ring (HOME, BAILLIE); or extended much wider, and seated in a large portion of the bowel, or in more than one part. It may, moreover, be ulcerated, callous, cartilaginous, scirrhus, or even carcinomatous, &c., and it is always attended by great distension of, and fæcal accumulations in, the part above it (MORGAGNI, LORRY, STOLL, BAILLIE, PORTAL, HOWSHIP, CALVERT, ANNESLEY, &c.). *e.* Hæmorrhoidal tumours, either in a state of inflammation or irritation, and fissures, &c. of the anus, will often occasion constipation: the latter, by rendering the sphincter of the anus irritable and spasmodically contracted, so as to oppose the expulsion of the fæces retained in the bowel; the former, by producing the same effect upon the sphincter, as well as by presenting a mechanical obstacle when seated internally. *f.* Constriction, or contraction, of a portion of intestine by adhesions or by cicatrization (THEDEN). *g.* Polypous, fungous, or fleshy excrescences growing from the inner surface of the cæcum, colon, or rectum; polypi of the sigmoid flexure of the colon passing down into the rectum (PORTAL, MECKEL, &c.); sarcomatous tumours, and scirrhus and carcinomatous productions in the rectum or colon, are irremediable causes of obstruction when they reach a certain extent, and occasion great, and sometimes enormous distension of the parts im-

mediately above them, with fæcal accumulations\*, &c.

10. *B.* Constipation is also not infrequently the consequence of diseases seated exteriorly to the coats of the intestines, and compressing or displacing them, and of which the following are the most remarkable:—*a.* Tubal or extra-uterine foetation, pregnancy, hernia, &c. *b.* Pressure on the rectum, arising from luxation or fracture of the os coccygis (*Ephem. Nat. Curios.* dec. iii. ann. v. and vi. ob. 241.). *c.* The pressure of tumours in the uterus or ovaria; prolapsed or retroverted uterus (HUNTER, WEDEL, SCHULTZ, MARSINNA, and myself). *d.* Various tumours seated between the uterus, vagina, and rectum (BADER, BONET, BURGGRAVE); abscess in the same situation (*Ephem. Nat. Curios.* dec. i. ann. iii. ob. 167., and myself); and too large a pessus in the vagina (BAYARD). *e.* Abscess between the bladder and rectum (CONRADI, LESKE, &c.); and enlargement or other disease of the prostate (FORD, myself, and others). *f.* The pressure of enlarged sacral glands (CRUICKSHANKS), of an enlarged ovarium descending in the pelvis (MOELLER, ODIER, &c.), and of various kinds of tumours—sarcomatous, steatomatous, fibrous, and cartilaginous—developed in the omentum, within the pelvis, &c. (LAUTH, REIDLIN, SCHAEFFER, OSIANDER, HUFELAND, &c.).

11. *C.* Obstinate constipation may also depend upon, or at least be connected with, *injury or disease of the spine*. In delicate females, it is not uncommon to find fæcal retentions proceeding from this cause. In many of such cases, much pain is felt when the spine is examined, indicating the presence of inflammatory irritation of the envelopes of the chord, or scrofulous disease of the bodies of the vertebræ. In cases of this description, the functions of the intestinal canal are impeded, or otherwise disordered, by the morbid influence exerted by the spinal nerves upon the organic nervous system, through the medium of their communications with this system.

12. II. The CONSEQUENCES AND TERMINATIONS of constipation require the utmost attention, as respects both the prevention of such of them as are unfavourable, and the recognition of their early approach. Among the most common *remote* consequences of fæcal retention, are cutaneous eruptions, headaches, vertigo, various

\* The following case is not only extraordinary but instructive:—M. G—, a medical officer in the French service, was always costive from birth. He ate largely, but seldom passed a stool oftener than once in one or two months; and his abdomen assumed a large size. At the age of 42, his constipation was usually prolonged to three or four months. In 1806, after medicines had been taken to procure a stool, which had not been passed for upwards of four months, abundant evacuations continued for nine days, and contained the stones of raisins taken a twelve-month before; but the constipation returned. In 1809, the enlarged abdomen became painful, vomiting supervened, and he died at the age of 54, having seldom, through life, passed more than four, five, or six stools in the year. On opening the abdomen, a fibrous partition obstructed the rectum about an inch from the anus. Immediately above this partition, the rectum was so enormously dilated as to fill all the pelvis, and nearly all the abdomen. The enormous cloaca contained thirty kilogrammes of brownish black and very offensive pultaceous fæces. Its inner surface presented gangrenous and ulcerated patches. The lower part of the colon was enlarged to the size of the stomach; which, with the small intestines, liver, &c., appeared diminished in volume and capacity by the pressure of the distended rectum. (RENAULDIN, in *Diét. des Scien. Méd.* t. vi. p. 257.)



dyspeptic symptoms, chlorosis, hysteria, and chorea. The straining at stool is liable to produce apoplexy and hernia in aged, and hæmoptysis in young persons. When constipation is neglected or improperly treated, the most serious effects are produced *immediately* upon the bowels themselves; *hæmorrhoids*, severe *colic*, passing into *ileus* or *enteritis*, being not infrequent results. These very serious consequences of constipation may, however, proceed as much from the use of too powerful drastic or acrid remedies, to procure evacuations, as from the fæcal retention. I have repeatedly seen dangerous effects follow a large, or even a moderate dose of castor oil, which had become rancid or acrid by exposure to the air, or by long keeping. When the constipation has continued long, the most distended portions of the bowels, either by flatus or accumulated fæces, sometimes pass rapidly and insidiously into an inflamed state, which, if not speedily subdued, soon terminates in sphacelation, or in a kind of sphacelating ulceration. In all cases, therefore, of obstinate, and even of early constipation, the state of the abdomen — particularly in respect of tension, tumefaction, hardness, definite or indefinite tumour, tenderness, heat and dryness of skin, and pain on pressure, &c. — should be carefully examined by touch, and *mediate percussion*; and if any of these symptoms be present, the accession or early progress of inflammation, and other unfavourable consequences now noticed, should be dreaded or even inferred. If, to these be added nausea and vomiting, heat of skin, high-coloured urine; an erect, white, or loaded appearance of the papillæ of the tongue; hard, constricted, or oppressed pulse, even although it may be slower than natural; and more especially if pain, tension, &c. be present, with hiccup; inflammatory action of a serious or unfavourable kind is obviously present, or even far advanced, and calls for the most decided means. (See arts. COLIC, and INTESTINES — *Inflammation of*.) Nor should we overlook the fact, that constipation is a very common symptom of enteritis, which may actually exist without occasioning much febrile disturbance, or affecting the pulse; great care is therefore necessary at the outset, in distinguishing simple constipation, from the constipation which proceeds from the slow and insidious occurrence of inflammation of the intestines, — a *diagnosis*, which only a careful examination of the abdomen, and enquiry as to the above symptoms, can furnish.

13. III. The PROGNOSIS in constipation is *very favourable* in slight cases, and in those of short duration, particularly when unattended by nausea or vomiting, or by pain, tenderness, and tumefaction of the abdomen, or by any febrile symptoms: it should be given with great caution when these symptoms are present, as they indicate the accession of inflammatory action: and it ought to be *unfavourable*, when the obstruction is prolonged notwithstanding the judicious employment of remedies, or when any of the symptoms indicating the accession of the unfavourable terminations noticed above make their appearance; for these states of disease are more dangerous when they supervene on obstinate or prolonged constipation, than when they occur in a simple and idiopathic form. When fæcal retentions apparently proceed from any of the organic

changes enumerated above (§ 9, 10.), the prognosis will necessarily depend upon the nature, seat, and extent of these lesions, as far as they can be ascertained; as, for example, when it is owing to enlargement of the prostate, contractions of the rectum and colon, tumours in the pelvis, &c., an opinion of the result, although generally unfavourable, will vary according to numerous concurrent circumstances, particularly as respects a permanent recovery, or an immediate or remote occurrence of a fatal issue.

14. IV. TREATMENT. — The means of cure in every case of constipation are directed with the intention, 1st, of procuring fæcal evacuations by as gentle and unirritating means as may be adequate to the purpose; and, 2dly, after having fully accomplished this end, of preventing a recurrence of a torpid condition of the bowels and digestive organs generally.

15. i. *The removal of existing constipation.* — A. The *slighter* and more common cases of constipation are most benefited by the use of such means as are generally employed to promote the secretions poured into the intestinal canal, and to excite its peristaltic action. About three or four grains of blue pill, either with or without a little Castile soap and extract of taraxacum, taken at bed-time, once or twice a week; and a draught consisting of equal quantities of the compound infusions of gentian and senna, with a little neutral salt, &c. (see F. 205. 266.) ; or of the compound decoction of aloes; on alternate mornings, will generally be all that is required. Besides these, any of the stomachic and aperient medicines prescribed in the Appendix may be adopted (see F. 215. 252. 558. 574.) ; the patient having recourse to the shower bath, or cold plunge bath, in the morning, and resorting regularly to the water closet after breakfast.

16. a. In the slight, as well as in *habitual* and frequently recurring constipation, it will be useful to ascertain, as accurately as possible, the particular viscera in fault, and what function is deficient (§ 6. *et seq.*). When we suspect that the duodenum and *small intestines* are especially affected (§ 6.), the compound infusion of senna, or the infusion of rhubarb, combined, according to the circumstances of the case, either with the alkalies or their sub-carbonates, or with vegetable bitters and tonics, or with ipecacuanha, taraxacum, and antispasmodics, as here directed, will generally remove all disorder. (See also F. 251. 391. 506. 562.)

No. 143. R. Infus. Rhei (vel Infus. Sennæ Comp.), Aquæ Pimentæ, aa 3vj.; Liq. Potassæ ℥ xx.; Extracti Taraxaci 3j.; Spirit. Myristicæ 3j. M. Fiat Haustus, mane vel horâ somni sumendus.

No. 144. R. Infus. Sennæ Comp. 3vss.; Sodæ Sub-carbon. 3jss.; Vini Ipecacuanhæ 3jss.; Spirit. Ammon. Arom. et Tinct. Hyoscyami aa 3j.; Tinct. Cardamom. Comp. 3ij. M. Fiat Mist., cujus capiat Coch. iij. larga mane nocteque.

No. 145. R. Infus. Calumbæ (vel Infus. Gentianæ Comp.), Infus. Sennæ Comp., aa 3ijss.; Liq. Potassæ 3jss., Extr. Taraxaci 3ss.; Spirit. Pimentæ (vel Myristicæ) 3ij. M. Fiat Mist., de qua sumantur Coch. iij. larga horâ somni, vel primo mane.

No. 146. R. Extr. Colocynth. Comp. ʒ ij.; Saponis Castil. gr. x.; Pulv. Ipecacuanhæ gr. vj.; Extr. Hyoscyami 3ss. Contunde bene simul et fiant Pilulæ xvij., quarum capiat binas horâ somni quotidie.

No. 147. R. Decocti Aloës Comp. 3ivss.; Liquoris Potassæ (vel Sub-carb. Sodæ) 3j.; Vini Aloës 3vj.; Extr. Taraxaci 3ij.; Spirit. Pimentæ 3ss. M. Capiat tertiam vel quartam partem pro dose, et repetatur pro re nata.

No. 148. R. Magnes. Sulphatis 3j. (vel Potassæ Sulphatis 3ss.); Infus. Rosar. Comp., Infus. Gentianæ



Comp., āā 3vj.; Acidi Sulphurici Arom. ℥x.; Tinct. Sennæ (vel Tinct. Aurantii) 3j.—3ij. M. Fiat Haustus, omni mediæ capiendus.

In most instances of constipation depending upon torpor of the small intestines, and *deficient biliary secretion*, a full dose of blue pill or of calomel should be exhibited at bed-time, and a common black draught the following morning, at the commencement of the treatment, with the view of promoting the secreting functions of both the liver and the mucous follicles of the bowels; and a moderate action ought to be kept up for some time subsequently by the remedies now adduced.

17. *b.* In those cases in which the *large bowels* are chiefly in fault, the preparations of aloes variously combined, the means already mentioned, particularly R 146, 147., or those recommended in the articles on the COLON, and on COLIC, will be generally found appropriate. In some instances, however, it will be requisite to have recourse to more powerful cathartics than I have yet mentioned—particularly when irritability of the stomach, or of the system generally, does not exist—and to promote their action by enemata. The following, or F. 140, 141. in the *Appendix* may be employed.

No. 149. R Pulv. Jalap. gr. xij.; Pulv. Scammoniae gr. v.; Potassæ Sulphatis 3j.; Olei Caryoph., et Ol. Carui, āā ℥ij. Tere bene simul, et fiat Pulvis in quovis vehiculo idoneo sumendus.

No. 150. R Magnes. Sulphatis 3vj.; Infus. Sennæ Comp. 3ij.; Tinct. Jalap. 3j.; Tinct. Opii ℥vj.—x. (vel Tinct. Hyoscyami 3ss.); Tinct. Castorei, Spirit. Pimentæ, āā 3j. M. Fiat Haustus.

No. 151. R Extr. Colocynth. Comp. 9ij.; Saponis Castil. gr. xij.; Olei Crotonis gtt. iij. (vel Extr. Nucis Vomicae gr. iij.) M. Fiant Pilulæ xii. Capiat duas horâ decubitus.

No. 152. R Mannæ 3j.; Infus. Anthemidis 3xij.; solve, et adde Olei Olivæ 3ijss.; Magnesiae Sulphatis 3jss. Sit Enema.

18. *c.* In cases apparently depending upon deficient tone of the muscular coat of the large bowels, and imperfect propelling power of the upper part of the rectum, I have seen benefit derived from combining the spirituous extract of nux vomica or strychnine with the pilula aloës cum myrrha, or with the compound extract of colocynth, as directed above in R 151., in place of the croton oil. When this state is connected with deficient secretion from the intestinal mucous surface (§ 7. *b.*), small doses of the croton oil, from one sixth to one half of a drop, combined with some other purgative, and repeated daily, or on alternate days, will remove obstructions from, and restore the secretions of, the mucous follicles. In cases also where the internal surface of the intestines are loaded with a viscid mucous sordes (§ 7. *g.*), it acts more efficiently than any other medicine, particularly when combined as above (R 151.), or with calomel or blue pill, and restores more permanently the functions of the intestines. I have recently met with several cases of constipation consequent upon attacks of pestilential cholera, and in nearly all of these I have inferred the existence of not only imperfect peristaltic action of the bowels, but also an accumulation of viscid, mucous, or albuminous sordes on their internal surface,—an inference confirmed by the state of the evacuations. The combination of purgatives now alluded to has proved more efficacious in removing this morbid condition, than any other I have employed.

19. *d.* In *children* and *young females*, constipation is generally attended, even if it be not

caused, by deficient secretion from the mucous follicles, and by an accumulation of mucous sordes (the *Saburra intestinales* of the older writers, and the *Embaras Sabural* and *Embaras intestinal* of French authors) on the internal surface of the bowels. In these cases, a dose of calomel, with either jalap or scammony, and triturated with sugar, and followed by castor oil, or the infusion of senna with salts, or by the decoction of aloes, &c., according to the circumstances of the cases, will generally procure full evacuations. But in many such cases, the repeated exhibition of these will be required before the collected sordes can be removed; and even when the evacuations have assumed a healthy appearance, it will be requisite to resort occasionally to purgatives combined with tonics and resolvents—such as senna, aloes, or rhubarb, with gentian, cascarilla, cinchona, or calumba; and with potass, soda, &c., before the functions of the bowels will be altogether restored.

20. *e.* When the fecal retention assumes the form of *obstipation*, and is attended with difficult or imperfect evacuation; or with frequent desire, and tenesmus; and with hard, rounded, scybalous discharges; we may infer the existence of rigidity of the longitudinal bands of the colon (§ 7. *e.*); and should combine anodynes and antispasmodics with purgatives. I have commonly derived most advantage from small doses of castor or olive oil, exhibited frequently, in some carminative or aromatic water, with a little tincture of hyoscyamus and ipecacuanha wine; and from demulcent, anodyne, and oleaginous clysters (F. 143, 144, 795.) Electuaries, also, consisting of the confection of senna, with cream of tartar, magnesia, extract of hyoscyamus, &c. (see F. 96. 98.), will generally prove more serviceable, in these cases, than very active medicines. When the retained scybalous faeces produce irritation of the colon, the frequent calls to stool, and the scanty, mucous, and watery evacuations, may lead the practitioner to suppose, if he rely upon the account of the patient only, that diarrhoea, instead of constipation, actually exists, and hence to adopt an improper treatment. In these cases, the warm or tepid bath, the addition of ipecacuanha, or hyoscyamus, or both, to the purgatives given by the mouth, and the use of clysters with infusions of ipecacuanha and linseed, and with olive, linseed, or almond oil, will generally procure the evacuation of scybalous faeces. When the bowels are distended by flatus, the operation of aperients will be most assisted by gentle friction of the abdomen; and confidence to persist in the use of it will be given by directing the friction to be employed with some liniment (F. 298. 306.), or with R 157. subjoined.

No. 153. R Olei Ricini recentis 3j —3ij.; tere cum Vitelli Ovi unius, et adde terendo, Vini Ipecacuanhæ ℥x.; Tinct. Hyoscyami ℥xv.; Tinct. Castorei ℥xx.; Aquæ Pimentæ 3xj. M. Fiat Haustus, 4tâ vel 5tâ quâque horâ sumendus.

No. 154. R Potassæ Supertart. in pulv. 3j.; Sodæ Sub-carbon. exsic. (vel Magnes. Calcinat.) 3ij.; Confectionis Sennæ 3jss.; Confectionis Rutæ 3ijss.; Extr. Hyoscyami gr. xij.; Pulv. Ipecacuanhæ gr. ij.—iij.; Tinct. Capsici 3ss.; Syrup. Zingiberis q. s. ut fiat Electuarium, cujus capiat partem quartam 4tis vel 5tis horis donec plenè dejecerit alvus.

No. 155. R Sodæ Sulphatis, Mannæ Opt., āā 3j., solve leni cum calore in Aquæ Menth. Virid. 3vjss., et adde Tinct. Sennæ 3j.; Vini Ipecacuanhæ 3j.; Tinct. Capsici 3ss.; Spirit. Carui 3ij. M. Capiat Coch. larga quatuor tertiis vel quartis horis.



No. 156. *R.* Olei Amygdalæ, Olei Ricini, Mannæ Opt., āā ʒjss.; Aq. Pimentæ ʒxj. *M.* Fiat Haustus, 4tis, 5tis, vel 6tis horis sumendus.

No. 157. *R.* Unguenti Cetacei ʒjss.; Olei Carui et Tinct. Opii āā ʒjss. *Misce, et fiat Linimentum, cum quo illinatur abdomen, urgente flatu.*

21. *B. a.* In the more obstinate or prolonged cases of constipation, which have resisted the above, or any other means usually employed to procure evacuations, we should endeavour to ascertain, by enquiring into the previous state of the patient's digestive and intestinal functions, and by examining the abdomen, rectum, and parts in the vicinity, the probable cause of obstruction. The account which may be furnished of the appearance of the evacuations heretofore, and of the facility with which they had been evacuated, as well as of the sensations felt before or at the time of evacuation, will very materially guide the judgment of the practitioner in concluding respecting the existence of organic disease of the colon or rectum, or in the vicinity of the latter. Frequent attacks of diarrhoea, tenesmus, or dysentery, previously to the occurrence of constipation, or of pain in the course of the colon, or along the sacrum, should always lead us to suspect narrowing, or thickening, or both, in some part of the colon or rectum (§ 9. *d.*). In such cases, we should endeavour to solicit fæcal discharges by oleaginous and saponaceous clysters, and frictions of the abdomen, rather than by purgatives taken by the mouth; and we ought not to be too officious in the use of these; but should so study the feelings of the patient, as to prevent irritation and febrile disturbance—the harbingers of inflammation—from coming on. In those cases particularly, examination of the state of the rectum, and the lower part of the colon, by the introduction of the long flexible bougie, as recommended by Dr. WILLAN, should not be omitted; and if any stricture exist within the reach of this instrument, its gradual dilatation should be attempted. If a stricture be reached, it may be of service to use a hollow bougie, along which enemata may be thrown up so as to pass beyond the seat of obstruction, which might otherwise not be overcome by them. Instances have been met with, in which stricture and organic disease of the colon have apparently existed for some time without constipation having been complained of; and yet the exhibition, when constipation did take place, of acrid purgatives in large and repeated doses, has been soon followed by an unfavourable issue, which, however, might not have been much longer deferred by any treatment whatever. Cases illustrative of this occurrence have been recorded by HOME, STERRY, ANNESLEY, &c. (See references.)

22. *b.* In almost every instance in which the bowels still remain obstinately costive after two or three doses of purgative medicine have been given, but without any urgent symptom being complained of, it will be more advantageous to use gentle means, to trust chiefly to enemata, and to wait patiently the result, than to prescribe medicines which will irritate, and invert the action of the upper part of the digestive tube without reaching the seat of obstruction. If, notwithstanding, symptoms of inflammatory action begin to appear; or if the stomach become irritable; or if the pulse be oppressed, hard, or constricted; or if the patient be plethoric and of a sanguine or

irritable temperament, venæsection; or the application of leeches to the abdomen, or both, should be resorted to, and hôt poultices and fomentations, or the warm turpentine epithem, or a blister, be afterwards placed upon the belly. The patient may then be left quiet for several hours, in expectation of the action of the purgatives previously given; or, if the stomach be irritable, soothing and anti-emetic remedies (F. 178, 179. 357.) only, or a full dose of calomel with opium or hyoscyamus, should be taken, and after a few hours the enema may be repeated. In cases of obstinate constipation, unconnected with contraction of the colon or rectum, a large dose of calomel, either alone, or with opium or hyoscyamus, may be exhibited, and repeated once or twice, at distant intervals; each dose being followed either by castor oil, or by the common black draught, or by half an ounce of turpentine with an equal quantity of castor oil in any suitable vehicle. But where inflammatory disease, or lesions consequent upon inflammation, are suspected to exist in either the colon or rectum, calomel, or even a full dose of blue pill, will often aggravate the mischief, unless emollient enemata be frequently thrown up. Indeed, I believe, from the experiments and observations I have made respecting the action of calomel on the alimentary canal—from remarking its effects in irritating and inflaming the inner surface of the colon and rectum when taken in large doses—and from the history of the previous ailments, and treatment of many of those who have had stricture of the rectum or colon—that a very large proportion of such cases has been brought on by the frequent use of calomel as a purgative.

23. *c.* When we believe that constipation is owing to a torpid or paralysed state of the muscular coats of the large bowels, and the accumulation of hardened fæces consequent thereon (§ 9. *a.*), oleaginous purgatives given by the mouth; in some cases, a full dose of calomel, followed by a turpentine and castor oil draught; and, subsequently, oleaginous, saponaceous, and terebinthinate enemata; are generally the most appropriate means. If, however, these fail, then small but repeated doses of castor, olive, or almond oil; frequent demulcent enemata; the aspersion of cold water over the abdomen or lower extremities; or injections of cold water, may be tried. (See § 26.). If there be great inflation or fæcal distension of the colon, friction, with the carminative liniment prescribed above (*R.* 157.), may also be employed, with various other internal and external means recommended in the articles on COLIC and COLON. In aged females especially, hardened fæces sometimes collect to such an extent, and are lodged so firmly in the rectum and lower part of the colon, as to require removal by mechanical means. Cases of this kind have been detailed by SCHURIG, PETIT, BISHOPRICK, SECHEVEREL, WHITE, &c., and have occurred in my own practice, as well as in that of many others. They require the careful introduction of a marrow-spoon, or some similar instrument, into the rectum, to break down the fæces; and subsequently the means just stated, particularly oleaginous and terebinthinate injections thrown up by the pump apparatus now in general use, which should be provided with a large and very long pipe, or with a long, hollow, and flexible



bougie, which ought to be passed as far as possible up the rectum.

24. *d.* If alvine obstruction be apparently owing to organic, malignant, or other diseases about the uterus, its appendages, the vagina, or rectum (§ 10.); or to spasmodic constriction of the sphincter ani excited by inflammatory irritation in its vicinity, or by hæmorrhoids, the warm bath, semicupium, or the hip-bath; the vapour of hot water and narcotic decoctions directed to the anus; anodyne and relaxing injections; and the extract of conium or hyoscyamus, made into either a suppository or an ointment, with the addition of a little of the extract of belladonna; may be prescribed, along with such other measures as the circumstances of the case may require.

25. *e.* When constipation is dependent upon, or associated with, disease of the spine, or inflammatory irritation of the membranes and envelopes of the chord, leeches should be applied near the place where pain is complained of; or the patient may be cupped in the vicinity, kept quiet, and in the horizontal position; and the action of the bowels promoted by the means stated above (§ 16, 17.), and by terebinthinate injections. If inflation of the bowels exist, the carminative liniment may be employed; and if tenderness, tension, or pain of the abdomen be complained of, leeches, followed by fomentations, &c. as already advised (§ 22.), should be resorted to.

26. *C.* Besides the above, other means have been recommended by authors in various states of the disease, and found of much service when appropriately prescribed. JOERDENS advises the frequent administration of *assafætida* in enemata, and, in cases of deficient secretion and healthy action of the colon, it is certainly of essential use, either alone or in conjunction with purgative medicines. STARKE recommends the inspissated *ox-gall*, both in the form of pills and in clysters. In the latter form, it is calculated to prove an excellent adjuvant of other means; and when combined with aloes, taraxacum, soap, extract of gentian, &c. (F. 559. 562.), it is very serviceable in restoring the healthy functions of the bowels, and digestive organs generally. WENDT directs repeated clysters of the decoction of *gratiola* to be thrown up. Numerous writers have advocated the application of *cold*, in cases of obstinate constipation. SCHENK, A FONSECA, BLANKARD, and LAISON advise the patient to walk or stand upon a marble pavement or slab; and BRASSAVOLUS states that SAVANAROLA cured the Duke of Ferrara, by making him walk barefooted over a cold wet marble floor. STEVENSON, FALCONER, PERCIVAL, and SPENCE direct the affusion of cold water over the lower and upper extremities, and adduce cases wherein the practice had been successful after other measures had failed. KITE, BARTRAM, SANCASSINI, and SCHMIDTMANN recommend cold epithems, and the affusion or aspersion of cold water, over the abdomen; and KAEHLER, KORB, and BRANDIS advocate the administration of cold clysmata, in addition to the employment of cold externally. The cold and tepid *shower bath*, the cold plunge bath, and warm and tepid bathing, have severally been resorted to in aid of other measures, and are frequently of use,—the former particularly

in habitual constipation, the latter in cases attended by difficult and imperfect evacuation, and seemingly dependent upon rigidity of the longitudinal bands of the colon. *Electricity* and *galvanism* have been employed successfully by KITE, SIGAUD LA FOND, GRAPENGIESSER, and CLARKSON; and the injection of *tobacco smoke*, and of a weak infusion of the leaves of *tobacco*, has been advised by VON MERTENS, VOGEL, and other authors referred to, when discussing the *treatment* of COLIC and ILEUS (*which see*). The decoction of *berbery*; powdered *charcoal* (MITCHELL and DANIEL), in the dose of one, two, or three table-spoonsful given every hour in milk or lime water; frictions of the abdomen (QUELMALZ); inunction of it with *linseed* or *olive oil* (RIEDLIN, &c.); fomentations consisting of senna leaves made hot and moist by boiling water, and placed over the abdomen (PETIT); purgative extracts; tinctures, and infusions, applied to this situation, either in the form of ointment or fomentation (SCHENCK, ALIBERT, &c.); and enemata containing *tartarised antimony* (ELIAS), have also been employed. The exhibition of *emetics* was advised by HIPPOCRATES, PRAXAGORUS, CÆLIUS AURELIANUS, and ALEXANDER TRALLES; and of *ipeacuanha* or *antimonial emetics* by STOLL, SIMS, SUMEIRE, DEPLACE, and HOSACK. I have seen benefit derived from inunction of the abdomen with an admixture of castor and linseed oils, to which three or four drops of croton oil had been added. In a great proportion of the cases of constipation which have occurred to me since 1817, when I first adopted the practice, very certain and immediate advantage has been derived from a full dose of calomel (either with or without opium or hyoscyamus), followed in a few hours by half an ounce of oil of turpentine, and an equal or somewhat larger quantity of castor oil, taken either in a cup of milk, or in a glass of some aromatic water. The action of these has usually been promoted by an injection containing castor, olive, or almond oil; and, if the operation has not been sufficiently copious, another dose of castor oil has been given, and the enema repeated.\*

\* The following *synopsis* exhibits a succinct view of the *treatment*:—1. If the pulse be hard or constricted, and if there be pain, increased on pressure, bleed generally or locally, or both—apply blisters or hot fomentations, or the cold affusion, or cold epithems, &c., on the abdomen; afterwards exhibit purgatives, enemata, &c. 2. If constipation seems to arise from diminished secretion and exhalation, give calomel or blue pill, carbonates of the alkalies, jalap, the purgative oils, senna, camboge, elaterium, croton oil, &c., according to circumstances. 3. If it depend upon a rigid fibre and habit of body, combine purgatives with relaxants and nauseants—with *ipeacuanha*, *antimony*, *colchicum*, *soda*, *hyoscyamus*, &c.; prescribe emollient and relaxant medicines in preference to those that are acrid; and give them with antispasmodics and sedatives. 4. When it arises from torpid peristaltic action and lessened secretion, conjoin tonics, gum resins, and bitters, with purgatives and aperients; myrrh, *assafætida*, *galbanum*, &c., with aloes; sulphate of quinine, or ext. of gentian with aloes; the alkaline solutions, with tonic infusions; use friction with stimulating liniments to the abdomen, or along the spine; resort to the cold salt-water bath or shower bath, and the tonic and aperient mineral waters of Cheltenham, Leamington, Vichy, and Carlsbad. 5. When it is attended by accumulations of hardened feces in the colon, have recourse to copious soapy or oily clysters—to the introduction of a marrow-spoon to break down the feces—to the injections of cold water, &c. by the valve-apparatus, with a long bougie attached to the pipe—to the aspersion of cold water on the abdomen, or the application of cold to the lower extremities, &c. 6. If it proceed from organic change of the large bowels, or of parts affecting them, solicit evacuation by emollient and relaxant enemata, and



27. ii. The *prevention of a recurrence of the disease* should be strictly guarded against, particularly after active cathartics have been given to remove it. Purgatives, aperients, or laxatives, combined with stomachic bitters and tonics (F. 187. 266. 872.), ought to be taken daily, and afterwards on alternate days, until the functions of the bowels are fully restored. The patient's diet should be light and nutritious; all astringent and indigestible substances avoided; and, if the abdominal secretions be deficient, an occasional dose of blue pill, or hydrarg. cum creta, and a course of taraxacum, with deobstruent laxatives and tonics (F. 390. 510. 873.), prescribed. Subsequently a course of Leamington or Cheltenham mineral waters, or the artificial Seidschutz, Marienbad, and Carlsbad waters, and in some cases the Pymont and Spa waters, will prove of much benefit. The shower bath, upon getting out of bed, or the cold salt-water bath, will further tend to promote the digestive and defæcating processes. Costive persons, with a large or pendulous abdomen, should wear a broad belt or bandage around it, which will serve to promote the functions of the bowels. The patient should carefully avoid the remote causes of constipation, attend daily to the first intimations to stool, and have an early recourse to medicine when such intimations are delayed beyond the usual time. When the bowels require the assistance of medicine to preserve them in a regular state, aloes may be combined with mastich and Cayenne pepper, or with a bitter extract, myrrh, and assafoetida, and taken daily about two hours before dinner.

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suppositories; soothe local and constitutional irritation, preserve the functions of the stomach, and give the alkaline solutions with conium, belladonna, &c. — (From the Author's short Notes of his Lectures delivered from 1824 to 1829.)

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CONSUMPTION. See PULMONARY CONSUMPTION, and MESENTERIC CONSUMPTION.

CONTAGION. See INFECTION.

CONVULSIONS. — SYN. Σπασμός, Gr. Spasmi Clonici, Motus Convulsivi, Distensiones Nervorum, Conductiones, Auct. Var. Convulsion, Spasme, Fr. Zuckungen, Ger. Convulsioni, Ital. Convulsion Fits.

CLASSIF. 4. Class, Nervous Diseases; 3. Order, Spasmodic Affections (*Cullen*). 4. Class, Affecting the Nervous Function; 4. Order, Affecting the Sensorial Powers (*Good*). II. CLASS, III. ORDER (*Author*, in Preface).

1. DEFIN. Violent and involuntary contractions of a part, or of the whole of the body, sometimes with rigidity and tension (tonic convulsions); but more frequently with tumultuous agitations, consisting of alternating shocks (clonic convulsions); that come on suddenly either in recurring or in distant paroxysms, and after irregular and uncertain intervals.

2. Convulsions have attracted a due share of attention from the medical writers of all ages. HIPPOCRATES states, that "convulsions arise either from repletion or evacuation" (*Aphor.* sect. vi. § 39.); and GALEN, whilst he admitted the propriety of referring them to these two morbid states, argued for a third, namely, irritation occasioned by a morbid humour. ÆTIUS adhered to a similar arrangement, but considered that the third of these pathological conditions performed the principal part. Subsequent writers, chiefly copiers or commentators on GALEN, adopted his views. ZACUTUS LUSITANUS imputed much importance to the second morbid state of GALEN, viz. excessive evacuation; and considered that a positive or relative dryness of the nervous and muscular system was occasioned by it. The writings of WILLIS and SYLVIVS DELEBOË made some alterations in the received doctrine of the origin of convulsions, by referring more than their predecessors had done to the nervous system and animal spirits, and less to



the influence of morbid humours. It was not, however, until the appearance of the writings of F. HOFFMANN, that a spirit of accurate investigation was manifested in this department of medical enquiry. This writer, to whom our science still continues under great obligations, regarded convulsions as a consequence chiefly of a morbid state of the spinal chord and its membranes, — an opinion which has been adopted by many, and which numerous facts seem to support, in respect of several manifestations of these complaints, although it cannot so frequently be shown that this part of the voluntary nervous system is that primarily affected.

3. The opinions respecting the nature and relations of convulsions, entertained during the last century, and what has past of the present, have been so numerous and vague, that the advantages resulting from a review of them could by no means compensate for the limits they would occupy. Such of them as deserve notice will be referred to hereafter. It may, however, be remarked respecting them, generally, that no two writers of reputation agree as to either the import of the word, the diseases coming within this denomination, or the manner of arranging and considering them. Under such circumstances, the systematic and eclectic writer might be placed in much difficulty, if he had not extensive and diversified experience to guide him. Upon this, however, my chief reliance is placed, even while I endeavour to profit by the labours of my predecessors, — some of them my followers in the adoption of important curative means in these affections.

4. If, in defining convulsion, we state it to be “*an anormal action of muscular or fibrous parts,*” we at once make it synonymous with spasm, and embrace a most numerous class of diseases, viz. those forming Dr. CULLÉN’S order, Spasmodic Diseases, as well as many of those in which spasm is merely a part of the morbid state. If we define it to be “*an irregular or anormal action of voluntary muscles,*” we shall comprise all those maladies, which usually put on nearly a regular form or type, owing to certain peculiarities of the spasmodic action and concomitant phenomena; as tetanus, epilepsy, &c. But if we adopt the more confined and precise definition given above, those disorders only which assume no regular type; but which, whilst they approach, on the one hand, those of a regular form, often pursue, on the other, very eccentric courses, and even anomalous states. It is impossible to consider the diseases of the frame in a way true to nature, and at the same time as abstract entities — as species perfect and distinct of themselves. They are individually, in truth, merely certain morbid states, lapsing on the one side insensibly into others, to which, although most intimately allied in every respect, different names have been but too arbitrarily assigned; and passing on the other side into affections otherwise denominated, although not materially differing in their natures. Thus, if we make spasm the essential character of one great family of diseases, we may divide it into subordinate orders, genera, and species, according to the parts affected, and the functions concomitantly disordered, and the permanency, the rigidity, the relaxations, and the frequency of recurrence of the spastic action. But still the

essence of disorder will be very generally the same; and each of these subdivisions — each of the manifestations of the particular morbid states made the basis of distinction — will so insensibly glide into each other, as to defy the possibility of drawing lines of demarcation between them. The practitioner will be unable, on many occasions, to detect in practice the specific differences assumed; and will continually meet, as I have in many hundreds of instances, with cases which he cannot refer to one species more than to another, and which are as much eclampsia as epilepsy, or as much what are usually called convulsions as either the one or the other. If we take the character of the spasm, in respect of permanency, rigidity, relaxation, and recurrence, as a basis of arrangement of all the diseases attended by anormal action of voluntary muscles, we shall have every grade, passing imperceptibly from the most acute form of tetanus through cramp, epilepsy, eclampsia, convulsions, &c., down to the most atonic states of chorea and tremor. Also, if we consider the affections called convulsions, and which are usually irregular in their forms, with reference to the character of the anormal contraction of the muscles, we shall perceive it in some cases of the most violent and spastic nature, frequently of some continuance, the relaxations being of brief duration, or scarcely observable; and in others nearly or altogether approaching to tetanic. These constitute the more *tonic* form of convulsions, from which there is every possible grade, down to the *atonic* or most *clonic* observed in chorea or tremor. Thus, then, anormal actions of muscular parts, like all other morbid actions, may, in respect of grade, be either above or below the healthy standard — *tonic* and *clonic* marking each respectively; but between which there exists every possible degree; these terms being therefore entirely relative, and conveying no definite and unchanging meaning. But, besides varying remarkably as to grade, the anormal actions of voluntary muscles may be attended by numerous phenomena giving them specific characters. Thus, when accompanied with complete insensibility, or any other superadded morbid condition, they have been denominated epileptic, hysterical, &c.; and, from this circumstance, they assume certain types, but of no very constant or immutable kind. When, however, they are not so associated, they constitute a simpler state of disease, and put on less regular forms, affecting either the whole of the voluntary muscles, or a greater or less number of them.

5. I. FORMS. — From this, therefore, it is to be inferred that, although Dr. CULLEN, and many others, have considered convulsions as characterised by the clonic nature of the spasms — by the alternation of contraction and relaxation without the control of the will — yet this does not universally obtain, they sometimes assuming states approaching to tetanic, and every degree of violence, as well as length of duration. The more regular and specific forms of convulsion, as epilepsy, hysteric fits, raphania, hiccup, tetanus, rabidity, &c., are discussed in separate articles; I shall, therefore, consider at this place only those simple and irregular states of convulsion which do not fall within its more specific manifestations.



6. Simple convulsions present great diversity of character. They have been already shown to differ widely in violence and degree; and they vary as greatly in duration, modes of accession, and recurrence, as well as in the number of parts affected by them. Hence they may be *acute* or *chronic*—most frequently the former; *partial* or *general*; *continued*, *recurrent*, or *intermittent*; *uncertain* in their accession, or *periodic*; and they may, moreover, attack a number of parts in succession. The circumstances and causes which originate them will also impart to them certain characters, which, although frequently difficult of detection, should not be overlooked. Thus, they are either *idiopathic* or *symptomatic*, most frequently the latter, even when the primary lesion illudes observation. But these diversities of form, although most deserving of attention, can only partially serve as a basis for the practical consideration of convulsions. I shall therefore view them—1st, in respect of their partial or local occurrence; 2d, as to their general manifestations; 3d, as they affect infants and children; and, 4th, as we observe them in connection with the puerperal states: I shall also notice them as associated with, or consequent upon, other acute diseases.

#### 7. i. PARTIAL OR LOCAL CONVULSIONS.—

Many of the disorders which have been imputed a convulsion of individual parts, fall more appropriately under the denomination of spasm. I shall therefore briefly notice only such as, from the alternation of relaxation and contraction, appear to approximate to the convulsive state. *A. Involuntary contractile parts* are more subject to spasmodic action, than to that which may be said to be really convulsive. Whether or not certain of the phenomena presented in various diseases of the alimentary canal, as gastrodynia, pyrosis, rumination, retchings, colic, borborygmi, ileus, the tormina of dysentery, &c., are more properly convulsive or spasmodic, must be entirely a matter of opinion, to which but little practical importance should be attached, as they are both modifications merely of the same proximate condition. This remark applies equally to the anormal actions sometimes presented by the urinary bladder and uterus; and it is probable that palpitations of the heart, and angina pectoris, are chiefly manifestations of convulsive contractions of this viscus. (See *ANGINA PECTORIS*, and *HEART—Palpitations of*.) That hiccup is altogether owing to convulsive actions of the diaphragm, cannot be doubted. (See *HICUP*.)

8. *B. Voluntary muscles and parts* present the most unequivocal appearance of partial or local convulsion; although several local affections, denominated convulsive by some writers, are, more strictly speaking, spasm or cramp of particular muscles. *a.* The muscles of the *eye-lids*, owing either to the contraction of an ill habit, or to irritation of the ophthalmic branch of the fifth pair of nerves, are sometimes clonically convulsed—forming the *nictitatio* of authors. *b.* The muscles of the *eye-balls* are also not infrequently similarly effected, particularly in infants and children—occasioning, particularly during sleep, rolling of the eyes. This state of local convulsion is common during dentition, and disorders of the stomach and bowels. Either a more severe state of convulsion of these muscles, ap-

proaching to spasmodic contraction of one or more of them, or a paralysis of their antagonists, will occasion distortion of the eyes, or strabismus, with or without irregular oscillations of the iris, dilated pupil, &c.; as in inflammatory and organic affections within the cranium, and in verminous disorders. *c.* Twitching convulsions of the *muscles of the face*, or those inserted into the lips; retraction of the angles of the mouth, giving rise to what has been called the *risus sardonius*; are often observed, but generally as a symptom of the invasion or actual existence of most dangerous diseases; as inflammation of the encephalon, or of the diaphragm, and various organic changes affecting the substance of the brain. Twitchings of the muscles of the face, however, sometimes occur in persons of a nervous and irritable temperament, or with an excited brain, without any apparent disease. *d.* Convulsive movements of the *tongue* are seldom observed unconnected with irregular movements of other parts, unless in the diseases now named, and in apoplexy. *e.* Slight convulsive actions of the *muscles of the lower jaw*, giving rise to grinding of the teeth in sleep, are very common occurrences in persons with worms, or other diseases of the alimentary canal; or excited circulation of the encephalon. *f.* *Trismus*, or spasmodic contraction of these muscles, in infants, arises from disorders of the prima via, the impression of cold, or irritation of the umbilicus, but does not strictly fall under the head of convulsions. *g.* A clonically convulsed state of the *muscles of the neck* are sometimes, but rarely, observed, producing convulsive tremor, or shaking palsy of the head, which is aggravated on certain occasions of mental perturbation, and nervous or vascular excitement. (See *PALSY*, *SHAKING*, and *TREMOR*.) *h.* The abnormal actions which approximate more closely to the permanent or spastic contractions, and affect one or more of the cervical and adjoining muscles, are much more common, and are often induced by a current of cold air, by over-straining, or by inflammatory irritation about the bodies, or intervertebral substance of the upper cervical vertebræ; or from disease about the medulla oblongata or base of the brain; or from irritation of remote parts—as of the genital organs of the uterus or ovaria; or from strangulated hernia,—an instance of which last has been observed by myself. In all such cases, the head is drawn more or less to one side, or backwards, or forwards; but similar flexures of the neck often are occasioned by the paralysis of muscles on the side from which the head is bent, the tonic or natural action of the unaffected muscles drawing the head from the paralysed side. In the one case, however, the muscles are rigid and strung like a cord on the contracted side, and more or less pain is complained of either in them or in the vicinity, particularly on attempts to bend or turn the head or neck in an opposite direction; whilst, in the other case, these symptoms are wanting. These are more properly cases of spasm than of local convulsion, as the contraction seldom alternates with relaxation, but is commonly more or less permanent. However, cases sometimes occur, which are intermediate between permanent spasm and convulsion, especially as a symptom of the diseases last referred to. *i.* Convulsive movements in the



*pharynx* and *œsophagus*, impeding or preventing deglutition, are frequent in hysteria, and in the last stage of several fatal diseases. *k.* They also affect the muscles of the *larynx*, the *diaphragm*, and other respiratory muscles, either separately, in rapid succession, or nearly simultaneously. Some of these affections are transient, and the result of slight causes; as in sneezing, coughing, sighing, sobbing, &c.: others are extremely dangerous, owing to the nature of the parts affected, the severity and continuance of the convulsive movements, and the circumstances in which they supervene; as in spasm of the glottis, spasmodic croup, certain states of asthma, with severe fits of coughing, singultus, &c. *l.* Convulsive actions also occur in the *muscles of the abdomen*; as in hysteria, common and lead colic, and in consequence of intestinal worms. The most remarkable instances of true convulsion of the abdominal muscles merely, that I have observed, have occurred in adult persons infested by the large round worm. *m.* The *muscles of the spine* sometimes experience convulsive actions, but more frequently spastic contractions, occasioned by hysteria, disease of the bodies of the vertebræ or membranes of the spinal chord, injuries of adjoining parts, strangulated hernia, acute rheumatism, the passage of biliary or renal calculi along the ducts, and inflammatory irritation of the uterus or ovaria. *n.* Either one or both of the *upper extremities* are occasionally affected by convulsions, more commonly both. The fingers are generally clenched around the thumb, which is drawn upon the palm; the arm being either extended forcibly, and the hand turned as in pronation, or the fore-arm bent upon the arm, or both these occurring in rapid alternation. Such are the more tonic convulsions of the upper extremities; but their muscles also experience slight and extremely clonic contractions; as the *subsultus tendinum* often observed towards the close of fevers and diseases of the brain; the more tonic or spastic convulsions, particularly when affecting one arm only, also arising from lesions of some part of the encephalon, or of the upper portion of the spinal chord. *o.* Convulsions of the *lower extremities* are characterised by analogous movements, and chiefly affect the flexor and extensor muscles. The toes are bent downwards, and the legs and thighs either drawn upwards or extended, or both the one and the other alternately.

9. Convulsions of voluntary muscles may occur as now described, or in two or more situations, or even in different or opposite parts, either simultaneously or in succession. They may affect one side of the body only, the other being in its natural state, or paralysed. They much less frequently attack either half transversely.

10. ii. GENERAL CONVULSIONS.—General convulsions observe no certain *mode* of accession. On some occasions they attack suddenly; but they are much more frequently preceded by premonitory signs, especially in children and chronic cases,—a knowledge of, and attention to, which may be made available in preventing their occurrence. They are also sometimes recurrent, or succeed each other, with more or less rapidity.

11. *A. The premonitory signs* are vertigo and dizziness, irritability of temper; flushings, or alternate flushing and paleness of the face; luminous

or other spectra floating before the eyes; various noises in the ears; partial loss of sight or hearing; restless or unsound sleep, or uncommon weight or drowsiness; fulness or prominence, and rolling of the eyes; clenching, or grinding of the teeth, clenching of the hands, &c. during sleep; a tumid appearance of the countenance and hands; coldness or cramps of the extremities; slight tremors, shivering, horripilation, shudderings or horrors; nausea, retching or vomiting; or pain and distension of stomach and left hypochondrium; unusual flatulence of the stomach and bowels, or other dyspeptic symptoms; pains in the loins or back; frequent sighing or sobbing; numbness of various parts; stammering or impeded utterance, loss of memory, and absence of mind; palpitations, or slowness and irregularity of pulse; slow, laborious, or irregular respiration; and, sometimes, a copious discharge of limpid urine. In some instances, leipothymia, or threatened syncope, precedes the general convulsions.

12. *B. a. The more tonic seizure.*—The convulsive movements constituting the paroxysm generally follow rapidly upon one or more of the above signs, and vary remarkably as to violence and duration. During their continuance, the countenance is very much distorted; the eye-balls are prominent, full, wild, staring, and rolled in all directions; the eyelids are either open, or rapidly shut and opened; the patient grinds and gnashes his teeth, and sometimes foams at the mouth, or protrudes the tongue. The alternate contractions and relaxations of the whole voluntary muscles, and contractions and extensions of all the limbs, are performed with the utmost irregularity, rapidity, and with so great force, as often to require the united strength of several persons to preserve the patient from injuring himself. In these struggles, the teeth, or even the bones of the extremities, have been, in some instances, broken. The respiration is laborious, interrupted, and sometimes accompanied by a hissing noise. The countenance, and indeed the whole scalp, are sometimes tumid, bloated, or red, and often leaden or livid towards the close of the fit, particularly in plethoric persons, when the respiratory actions are much impeded, and the affection originates in cerebral disease. In other cases, the face is pale, and the pulse weak, or small and constricted. The urine and fæces are occasionally voided with violence during the paroxysm: occasionally large quantities of limpid urine are passed. In these, the pulse is generally full, strong, and commonly slow or irregular. In many instances, the general sensibility and consciousness are but very slightly impaired, particularly in the more simple cases, and when the proximate cause is not seated in the encephalon; but in proportion as this part is affected, primarily or consecutively, and the neck and face tumid and livid, the cerebral functions are obscured, and the convulsions attended by stupor, delirium, &c., or rapidly pass into, or are followed by, these states.

13. *b. The more clonic convulsions.*—Such are the common manifestations of convulsions, when they are not occasioned by inanition; the paroxysms, however, varying greatly in violence, duration, and frequency of recurrence, according to the degree of vital energy, and numerous other



circumstances. But when they arise from, or are associated with, exhaustion, excessive discharges, and evacuations of the vascular system, they assume a somewhat modified character. They are then not attended by sopor; the general sensibility and cerebral functions being but little, or not at all, affected. The pulse is frequent, small, weak, broad, or open; the features are but slightly distorted; the countenance is pale and collapsed; and the limbs and extremities cold, and much less rigidly convulsed than in the tonic or more spastic seizures. In many cases, the convulsive movements resemble a succession of general shocks, succussions, or shudderings, sometimes of great violence, and often of considerable continuance, occasioning the bed or room to shake, and terminating the life of the patient: in others, they consist of constant tossings of the limbs and trunk.

14. *C. Duration and recurrence.*—The paroxysm may cease in a few moments or minutes, or continue for some, or even many, hours. It generally subsides rapidly, the patient experiencing, at its termination, fatigue, headache, or stupor; but he is usually restored in a short time to the same state as before the seizure, which is liable to recur in a person once affected, but at uncertain intervals. After repeated attacks, the fits sometimes become *periodic* (the *convulsio recurrens* of authors). In adult females, they commonly accompany the menstrual periods. When they arise from organic disease within the cranium, each successive interval is generally shortened, until their recurrence is so frequent that the patient is scarcely recovered from the languor, or other symptoms, consequent on one seizure, until he has another, which at last either ends in profound coma, or terminates life.

15. *D. The modifications* of convulsions are extremely numerous. In some cases, the respiratory muscles are much affected, and the fit is accompanied with yelling and shrieks, evidently not proceeding from pain (the *convulsio ejulans*, or shrieking convulsion). In other instances, the abnormal movements shift from one part to another, or attack various muscles in succession. In these, the seizure is comparatively slight, and the cerebral functions not remarkably disturbed; the *convulsio erratica* of Dr. GOOD. In rarer cases, the seizure assumes the form of *convulsive tremor*, as remarked by Dr. PRICHARD; is attended with a hot perspiring state of the head, vertigo, and slight stupor; and continues one, two, or three hours.

16. *a.* Besides these, various other forms of convulsion occur, particularly in persons under the influence of a morbidly excited imagination, or religious enthusiasm; and in females endowed with the nervous and irritable temperaments, with great mobility of the muscular system, and who are affected by nervous or vascular excitement of the generative organs. On many occasions, these seizures have been propagated to a number of persons by sympathy. The convulsions which became almost epidemic in the west of Scotland, in 1742, and were occasioned by religious enthusiasm, are not only instances of a peculiar form of this affection, but also among the most striking on record of the influence of imagination, and of sympathy, or of imitation, in disordering the functions of the body. A number of persons

were attacked nearly at the same time, when hearing the addresses directed to the imaginations and passions of their hearers by the followers of Whitfield; and always when impressed by the denunciations of vengeance, and hopes of salvation, which they set forth. The mental agony which was thereby induced, gave rise, in many, to the most violent tremblings and agitations of the body, which were frequently preceded by faintings, and followed by convulsions, and subsequently by sobbing, weeping, and crying aloud. In some cases, the convulsions produced epistaxis, which generally terminated the seizure. Such appears to have been the usual course of the paroxysm, according to the meagre accounts which have been furnished of it. (See *Edin. Med. and Surg. Journ.* vol. iii. p. 442.) The convulsions described by Mr. CORNISH as having been prevalent in Cornwall in 1813 and 1814, owing to the same causes, hardly differed in any respect from the above.

17. *b.* The convulsions which were prevalent in some of the Zetland Isles during the middle and towards the close of the last century, but which have seldom occurred there since that period, seem to have had some resemblance to the foregoing, as well as to hysteria. Dr. WHYT has referred to the frequency of convulsions in these islands; and has adduced the extreme facility with which they were propagated among young women, as a proof of the existence of a wonderful sympathy between the nervous systems of different individuals. The convulsions now alluded to, commonly attacked adult females when at church; but men and young girls were not altogether exempted from them. They are described very nearly as follows, by gentlemen who had frequently witnessed them:—Persons affected, generally fall down in apparent fainting or swooning fits, and soon afterwards utter wild cries and shrieks, the sound of which puts all who are subject to the disorder in the same situation. Their limbs and bodies are tossed about, the most frightful screams being uttered by them all the while. Their heads are also thrown from one side to the other, and their eyes are fixed and staring. In this manner they roar and struggle for five or ten minutes, and then rise up without recollecting a single circumstance that happened to them, or being in the least fatigued by the exertions made in the fit. Females are most commonly attacked in a crowded church, and on occasions of public diversion and merriment.

18. Similar instances of the spread of convulsions, by the infection of sympathy or imitation have been recorded by writers, and cases of it have occurred within the observation of the author. Dr. HAYGARTH has adduced a remarkable occurrence of this description.—Twenty-three females, from 10 to 25 years of age, and one lad of 17, who had all intercourse with each other, were seized, in 1796, in Anglesea, with slight pain of the head, or of the stomach and left side, followed by twitchings or convulsions of the upper extremities, continuing with little intermission, and with much violence, for a considerable time. The disorder was not so violent in bed; but it continued in some cases during sleep. The pulse was moderate, the bowels costive, and the general health not much impaired. There was usually hiccup; and, when the con-



vulsions were most violent, giddiness, with loss of hearing and recollection. During convalescence, the least fright, or sudden alarm, brought on a slight paroxysm. (See CHOREA AND RELATED AFFECTIONS, &c.)

19. iii. INFANTILE CONVULSIONS.—Convulsions often attack infants of a delicate and irritable frame, and those who are seized by severe internal or constitutional disease, or are suffering some concealed visceral irritation. They occur most frequently in children under four or five years of age, and particularly during dentition. They decline in frequency from this epoch to the commencement of the second dentition, or about the seventh year, when they again are often met with. Mr. NORTH doubts that any increase takes place at the seventh year. The above is the result of my experience, which in great measure agrees with that of BEAUMES, TISSOT, and others. As infantile convulsions present various peculiarities in their causes, phenomena, complications, and consequences, and are besides among the most important morbid conditions which come before the practitioner, I shall consider them apart.

20. A. *Premonitory signs* often usher in the attack, but occasionally no such symptoms are observed. I suspect, however, that they are more commonly altogether overlooked, than entirely absent. They consist chiefly of manifestations of generally increased irritability. This is shown by the temper, if the child be a few months old or upwards; by want of sleep at night, and heaviness in the day, or by perfect insomnia; by a lighter and shorter sleep than usual, the child starting up on the slightest noises, or as from a frightful dream, with fits of screaming without evident or sufficient cause; by alternately flushed and pale countenance, or unwonted animation of the face and eyes, followed by languor and heaviness; by a half-closed or open state of the eyelids during slumber, with startings and twitchings; by fixed, vacant, staring eyes, the pupils being either contracted or dilated, or frequent oscillations of the iris, without being influenced by the admission of light, or contraction of one pupil while the other is dilated; by stretchings or rigid extensions of the limbs; by hiccup, or irregularity of breathing, or short gasps, followed by long laborious inspirations; by twitchings of the fingers, or clenching of the hands, or pressure of the thumb upon the palm, the fingers being extended and separated from each other, or frequently moved about; by the sudden relinquishing of the breast soon after having sought it eagerly, and the throwing back the head, with an expression of anxiety, and an appearance of difficult deglutition; and by fullness of the upper lip, with a pinched nose and countenance, and slight blueness below the eyes and about the mouth. Many of these symptoms, designated by the vulgar, "*inward fits*," may with justice be attributed to inflammatory irritation of the arachnoid, as indeed contended for by PARENT, MARTINET, LALLEMAND, &c.; and, in my opinion, especially of the arachnoid of the base and internal surfaces of the brain. BRACHET and NORTH have enumerated them as premonitory of convulsions, which they doubtless most frequently precede; but in a great many cases convulsions hold the same relation to inflamma-

tory and febrile attacks in infants, as rigors do to the same diseases occurring in adults; and hence these signs must often be common to both, and also to some other infantile diseases. This is shown by their frequency in remittent fever, and other inflammatory irritations of the gastro-intestinal mucous surface of children.

21. B. *The paroxysm of convulsions* in children is similar to that occurring in adults. In the most severe cases, there is a violent, involuntary, and alternating or convulsive action of all the voluntary muscles extending to some internal or involuntary parts; in which, indeed, the affection often seems to originate, or which appear to be those first affected. In plethoric infants, the face and scalp are tumid, reddened, and subsequently livid; the eyes are distorted and staring, or turned up beneath the upper eyelid, leaving only the sclerotic visible; the respiration is impeded and laborious, but very rarely attended by foaming at the mouth and protrusion of the tongue, unless the paroxysm be epileptic. The whole surface often becomes slightly violet-coloured towards the close of the fit, and the hands tumid. In many instances, particularly in weak or exhausted children, the seizure is much less violent, the countenance being pale and collapsed, and the convulsions more clonic. There are sometimes only twitchings of the muscles of the face, and alternate contractions and relaxations, or rapid shocks, of a few parts, or of only one half of the body, or of various parts in succession, with slight blueness about the eyes and mouth; but more frequently the whole body is convulsed, and the countenance distorted and haggard. The mental faculties, and general sensibility, in the slight or clonic convulsions, are generally not interrupted. They are also, however, frequently obscured, but only during the height of the paroxysm; and sometimes even entirely abolished in the severe recurrent convulsions attending cerebral disease—the *eclampsia* of some authors (§ 24.).

22. C. The utmost diversity exists as to the *duration and recurrence* of the fit. In some cases it is only momentary, or of a very few minutes' duration. In other instances it continues for several hours, with frequent remissions. It may likewise cease, and shortly afterwards return, and thus subside and recur at short but irregular intervals for several times, and at last cease altogether, or terminate life. Or the first seizure may be so severe as to be fatal. These recurring fits are often at last attended by insensibility, which is not altogether, or even not at all, recovered from in the intervals. This form of the malady is more common in children than in adults, excepting as it occurs in the puerperal states, or towards the termination of tumours and abscesses in the brain. As the convulsive movements constituting the fit become less and less violent and constant, and respiration fuller and freer, the natural appearance of the surface returns, and the child is enabled to cry; it afterwards falls either into a refreshing sleep, or, if the convulsions have a cerebral origin, into a stupid or lethargic state of various duration.

23. D. There is a species of spastic or tonic convulsion, which is but rarely met with, affecting chiefly the extremities. It seems more nearly allied to spasm than convulsion, into which, however, it sometimes passes; and occurs, chiefly,



in very young children, and in those approaching to puberty, particularly those who are nervous and irritable. I have seen but few instances of it; but it has more frequently been seen by MM. JADELOT and TONNÉLLÉ. It consists of rigid contraction of the upper and lower extremities, of the former only, but more frequently of both. The hands are slightly bent on the forearm, and the feet are stretched in the same axis with the leg. The spastic action of the muscles continues for several hours, or even days, then ceases, and returns, and often thus recurs frequently at short intervals. The intellectual faculties, the general sensibility, and the muscles of the trunk, are not affected; and the pulse and natural functions not materially disturbed. The cases of it which have occurred in my practice, have all been evidently owing to the irritation of worms, or morbid matters in the alimentary canal, or to dentition.

24. *E.* Another form of convulsions is much more frequently met with in children, to which the name of *Eclampsia* has been given by ROSEN, SAUVAGES, BRACHET, and others, and which has been considered as infantile epilepsy by some, and, with more justice, by others, as convulsions occurring in the more robust children as a consequence of cerebral congestion of an active form. But it differs from epilepsy, in the absence of foaming at the mouth, by the irregular and frequent recurrence of the attack, by its longer duration in most cases, and by its uniform connection with evident signs of fulness of blood, or acute disease in the brain. This form is seldom preceded by precursory symptoms of any continuance. The child cries, its face and scalp become red and tumid, it loses consciousness, and is seized with violent convulsions, or with tremor and rigidity, or a succession of spastic shocks of the limbs. In a few seconds, or minutes, or even hours, the seizure subsides; but is generally renewed at short intervals; the head remaining hot and pained after each return of the fit, which never terminates by a critical sleep of short continuance, and in restoration of the healthy functions, as in epilepsy, unless assisted by active treatment, but is frequently followed by profound stupor or complete insensibility. From the foregoing it will be evident that *eclampsia* is merely a more severe form of convulsion, differing from others only in respect of the severity or tonicity of the muscular contractions, the more complete abolition of sensibility and of the cerebral functions, and its more uniform dependence upon congestion of the brain and its consequences (§ 21.). The *eclampsia* of children is in every respect similar to the convulsions of the puerperal states (§ 29.).

25. *F.* There are certain phenomena connected with the accession and the course of the convulsive fit that require attentive observation, as they furnish indications of the pathological state occasioning the seizure, and, indeed, form the basis for rational indications of cure. These have intimate relation to the origin of the paroxysm either in repletion or inanition — in congestion, or in anæmia of the cerebro-spinal masses; in which latter the convulsions of children not infrequently originate, as shown by Dr. M. HALL, and subsequently by others, and as I have had frequent opportunities of remarking for many

years. When the convulsion is attended with a congested state of the circulation in the head, it will generally be readily recognised, both from the history of the case, and from the premonitory and concomitant symptoms. The warm, tumid scalp and face; the flushed countenance; the contracted pupils and suffused conjunctiva; quick, full, or hard pulse, particularly of the carotids; are evident signs of an excited circulation in the brain, not infrequently either accompanied with, or running into inflammatory action. When the countenance and scalp are swollen, full, dark, or livid; the fontanelle elevated and tense; the eyes distorted, prominent, vacant, and stupid; the pupils dilated; the veins of the head and neck large and dark; the pulse slow, irregular, or oppressed; the respiration laborious; the vessels within the cranium are evidently congested. Dr. JOHN CLARKE, and many other writers, impute the convulsions of children to irritation or organic change, either directly or indirectly induced in the brain or its membranes, particularly in the arachnoid, according to M. BRACHET. We shall see, when we come to treat of the proximate cause of convulsions, that, although this may be most frequently the case, it is by no means universally so. For we occasionally meet with convulsions consequent upon exhaustion, and even anæmia, as in the last stages of chronic diarrhoea or other diseases; and after large or repeated depletions, where there is no evidence of irritation of the arachnoid, or of organic change. In many such cases there may occur notwithstanding, especially during the height of the paroxysm, temporary and slight congestion of the head, as shown in the article BLOOD, (§ 54 — 61.); but, still, evidence of *anæmia* of the brain, and, indeed, of the general system, will be furnished in the depressed and relaxed fontanelle; in the pale, collapsed, and pinched features; in the retention of consciousness and unimpaired general sensibility; in the bloodless and dull appearance of the conjunctiva and cornea; in the state of the pulse in the carotids, and the low temperature of the head; and in the pale, shrunk, wasted, and often bloodless condition of the whole surface.

26. There is a disease to which infants are liable, that consists of a spasmodic contraction of the muscles of the larynx and of the extremities, and which has been confounded with convulsions, or with spasmodic croup, and variously denominated. As the muscles of the larynx are chiefly affected, and as the disorder consists of spastic rather than convulsive action, it is treated of in a separate article. (See LARYNX, SPASM OF.)

27. *IV. PUERPERAL CONVULSIONS.* — Convulsions may come on (*a*) during the latter months of pregnancy; (*b*) during parturition; and (*c*) during the first fortnight after delivery. They may be partial or general, most commonly the latter; and they may assume various shades of tonicity, from a state of tetanic violence to the more clonic form, characterised by alternating contraction and relaxation; but they usually present very nearly the same phenomena as *eclampsia* — being attended by loss of consciousness, and recurring paroxysms, between which sensation is not restored.

28. *A. Premonitory symptoms* commonly usher



in the seizure ; but, in some cases, they are either absent, or so brief in duration, or so slight, as to evade detection. CHAUSSIER thinks that they are scarcely ever wanting altogether. The patient usually complains shortly—sometimes for several days—before the attack, of lassitude, depression, and a feeling of indisposition which she cannot well describe ; frequently of disorder of the stomach ; often of weight or pain in the head, or of drowsiness, vertigo, and sparks, or various dark or bright objects, floating before the eyes. These symptoms are renewed at intervals during a day or two, and are occasionally attended by embarrassment of speech. To these usually are superadded, shortly or just before the seizure, a change in the expression of the countenance ; partial or occasional failure of sight, or loss of sight ; sometimes loss of hearing ; haggard, vacant, and fixed state of the eyes, with a dilated pupil ; ringing or other noises in the ears ; sometimes most acute and splitting pains in the head, with a flushed neck and face ; generally sickness, pain, oppression and anxiety at the stomach ; thirst ; a full and quick pulse ; subsequently a slower pulse ; and swelling of the neck and countenance ; tetanic stiffness of the wrists ; cramps in particular muscles or parts ; twitchings of the muscles of the face ; shocks or shudderings through the frame ; altered respiration ; loss of consciousness ; and all the phenomena constituting the developed seizure. Dr. J. F. OSIANDER states that he has seldom observed a tumid state of the face and hands wanting as a premonitory symptom. If the convulsions occur during parturition, the pains often become feeble and frequent before the seizure.

29. *B. The complete seizure.*—To these succeed involuntary contractions of the muscles of the face and jaw, instantly followed by spasmodic succussions, or general convulsions of a violent or tonic character ; sometimes approaching to tetanic, but commonly closely resembling eclampsia ; or the universal convulsions of the epileptic or hysterical paroxysm. The respiration is laborious, imperfect, sonorous, and hissing, — frequently with foaming at the mouth, — and the tongue is often protruded ; the eyes are injected, prominent, fixed, staring, or rolling ; the countenance and head tumid, red, or livid ; the limbs are strongly convulsed, and tossed about ; the heart beats strongly ; and sensibility and consciousness are entirely abolished. After a short time the convulsion subsides ; respiration becomes less laborious, and the countenance less livid ; but the comatose stupor continues, sometimes with slightly stertorous breathing ; when, after an indefinite, but generally a short, interval, the spasmodic succussions and general convulsions return as before, or with slightly modified severity or duration, and subside into stupor as before. Thus they may recur two or three times — more frequently, several or many times — when the patient either quickly awakes, unconscious of what has passed, as if from a slumber ; or passes into a more comatose state ; or recovers partially ; sight and hearing, or speech, or both, being lost for a time. Or she may experience some one of the unfavourable terminations hereafter to be noticed.

30. It may be generally remarked, that, upon the accession of puerperal convulsions, a flux of blood takes place to the head and superior ex-

tremities ; the veins of the lower limbs becoming proportionately empty, and the pulsation of their arteries being comparatively small and weak. The worst forms of the attack are often attended by a firm spasmodic constriction of the cervix uteri, preventing the expulsion of the foetus. M. MENARD states, that, in the majority of cases of death by convulsions previous to delivery, the child has been found dead, the contraction of the features and extremities denoting that it had participated in the affection of the mother : this, however, wants confirmation. In some instances, the child has been unexpectedly born during the violence of the convulsions, as if expelled by them with unwonted celerity.

31. *C. Modifications.* In persons of a nervous temperament, local pain or irritation, or even exhaustion alone, may induce that state of cerebral affection upon which convulsions are consequent, without the supervention of plethora, and active congestion of, or determination of blood to, the brain characterising the great majority of cases. In these persons, the seizure is sometimes preceded by sinking, leipothymia, or fainting ; the countenance is neither tumid nor livid ; the eyes and face are unsuffused, but wild — often sparkling, staring, or rolled irregularly ; the pulse is small, hard, or constricted ; the urine is frequently copious and pale ; and the agitations and tossings of the limbs greater, but less rigid or spastic, than in the mixed epileptic and apoplectic forms described above. In these cases, there is evidently cerebral irritation, or erithism ; and, during the paroxysm, abolition of consciousness : but the patient generally either partially recovers her sensibility between its exacerbations or recurrences ; or awakens out of this state entirely restored, and without experiencing any of those sequelæ which are left by the more congestive attacks. In other instances, seizures occur, presenting characters intermediate between these ; but the first described state is by far the most common. From this it may be inferred that convulsions, in any of the three periods connected with child-bearing, will evince modified phenomena, according to the constitution, temperament, habit of body, predisposition, and previous ailments of the patient. In the plethoric, epileptic, irritable, sanguine, and robust, it will present the characters of eclampsia or epilepsy — the most common — or of apoplexy or coma ; and in the hysterical, the nervous, the delicate, &c., it will assume these now noticed, which approach those of a severe hysterical attack. The convulsions which come on in the puerperal states from large losses of blood, are either of this kind, or of one closely resembling it, or intermediate between it and the epileptic.

32. *V. CONVULSIONS ASSOCIATED WITH OTHER MANIFESTATIONS OF DISEASE.*—Convulsions may occur on the *invasion*, during the *course*, and at the *crisis* or *decline* of a great number of acute diseases, particularly in children under eight years, about the period of puberty, and in females of a nervous and susceptible constitution. Their connection with irritations, &c. in the *prima via*, and with organic diseases in, or affecting the large nervous masses, is considered at another part (§ 37. 44, 45.) ; but their association with some other maladies require a more especial notice in a practical point of view. *a. The invasion* of various



acute distempers is often attended by convulsions. Indeed, in some of the severe diseases to which young children are liable, particularly the exanthematous fevers and inflammations, convulsions usurp the place of the cold stage or rigors which usher in these diseases in adults, and are generally preceded by coldness of the surface.

When occurring in this manner, they should be regarded as indicating one of three things, viz. a morbid susceptibility of the nervous system, and predisposition to disease in the cerebro-spinal axis; or an approaching developement of febrile reaction and of eruption, if the patient be of a sound constitution; or else an imperfect evolution of both, with a disposition to visceral irritation, inflammation, or effusion, particularly of the brain or abdominal viscera, if the habit of body be in fault, or if there exist any hereditary disposition, or vice remaining after previous disease.

33. *b.* The course of various diseases sometimes becomes associated with occasional or recurring convulsive seizures; often of a partial, or of an irregular, peculiar, or anomalous character; but frequently, also, such as those described under general convulsions (§ 12, 13.). Children, and females about the period of puberty, are most liable to these complications. We observe these seizures in whooping cough and croup; in the remitting fevers of infants; in mania, and febrile insanity; in inflammatory and numerous organic diseases of the brain (§ 37. 44. 45.) and spinal chord; in verminous complaints, and other disorders of the alimentary canal; in organic lesions and calculi of the kidneys and urinary bladder; and in states of nervous and vascular excitement or irritation of the female organs. In all these complications, either active congestion or determination of blood to the head, or irritation of the cerebro-spinal axis and membranes, or both these states, may be presumed to exist; active congestion being occasioned by impeded return from, with increased impetus of the circulation to, the brain and medulla oblongata; irritation of these parts being generally propagated thither from some portion of the organic nervous circle, and through the medium of this circle, in which it had been primarily excited. We not infrequently observe convulsions attended or followed by *mania* and insanity, or even supervene in the course of these mental disorders. When this is the case, the convulsive seizure is commonly of a tonic and acute form, and approaches nearly to eclampsia and epilepsy, constituting the *maniacal convulsions* of authors. The convulsions which occasionally are observed in females, in connection with irritation of the sexual organs, are evidently owing to the propagation of disorder, through the medium of the organic or ganglial, to the spinal nerves, or to the chord itself, or even to the brain; as well as to the extent to which these various parts of the cerebro-spinal system are thereby influenced; and the various forms which the convulsions thus originating commonly assume, are to be imputed to the existing state of local or general plethora, or to the degree of determination of blood to the head with which the superinduced irritation is attended. When we reflect upon the connection of the organic nerves with the spinal, and especially on the mode of that connection with the brain itself and the rest of the cerebro-spinal system, we shall

not be surprised that irritation of the extremities of the organic nerves, either in some one of the female organs, or in some part of the *prima via*, excites in one person, according to peculiarity of temperament, hereditary predisposition, habit of body, or state of vascular plethora, convulsions of a spastic or tonic character in the limbs and trunk, the cerebral functions being undisturbed; in another person, convulsions either of a clonic or irregular form, consciousness also being retained; or either of these forms, or both of them variously or singularly mixed, with partial or complete deprivation of sense and mental manifestation, or with a comatose or maniacal delirium superadded. Nor should it be a matter of wonder that irritation thus originating gives rise to various other abnormal nervous and muscular phenomena, such as catalepsy, ecstasy, hysteria, &c.

34. *c.* Convulsions sometimes also usher in the *crises* of fevers and other acute diseases. This occurs most frequently in delicate or hysterical females, the abnormal contractions assuming a variety of forms, and often an hysterical character; but it also not infrequently is observed in the male sex, especially in young and delicate persons. This association of convulsions is generally dependent upon a severe affection of the brain in these fevers, and attended by either coma or delirium; and although they may indicate a favourable change, particularly when accompanied with, or immediately followed by, other critical phenomena, or when they put on the true hysterical form, yet they may be the outward signs of an exasperation of the cerebral or cerebro-spinal affection, particularly when the mental faculties and general sensibility are not soon afterwards restored. Other morbid associations, as with worms, diseases of the brain and spinal chord, &c., may be considered as causes of convulsions rather than complications.

35. II. DIAGNOSIS.—Simple convulsions may with difficulty be distinguished from *epilepsy* and *hysteria*. They cannot readily be mistaken for *tetanus* or *rabidity*. There are many cases, which the nature of the exciting cause, and the history of the case, show to be different from true epilepsy, and yet they cannot easily be distinguished from it during the height of the paroxysm; and the remark applies equally to the hysteric fit. In fact, convulsions present so many and so slight grades of difference, as to the spastic contraction of the muscles, and the frequency and rapidity of its alternation with relaxation,—as to the presence of, or immunity from, cerebral disorder, as well as to the nature and extent of such disorder,—are so intimately allied in respect of their causes, of the particular system of the frame upon and by which these causes produce their sensible effects, and of the nature of these effects as far as they become symptoms or signs of the particular lesion which occasioned them, that the difficulty of diagnosis is very great in many instances, excepting to the acute and experienced observer, whilst it is sufficiently easy in others. *a.* Generally, however, simple convulsions will be readily distinguished from *epilepsy*, by the retention of consciousness and general sensibility in the former, excepting in the height of the paroxysm in the severer or more plethoric cases, as in eclampsia and puer-



peral convulsions, in which both are lost; by the general absence of the consecutive sleep or sopor of epilepsy; by the irregular and frequently recurring form of the seizure; by what is known of its origin and connection with obvious causes, and by the mode of its attack and of recovery from it. There are also various symptoms which, although common to eclampsia, puerperal convulsions, and *epilepsy*, are yet peculiarly characteristic of this last; and we find, in addition, other phenomena which simple convulsions seldom present, particularly the frightful scream on the accession of the epileptic fit, the antecedent aura or peculiar premonitory signs, the very sudden and unexpected seizure when the aura is wanting, the expulsion of the seminal and prostatic secretions, as well as of the alvine excretions; the more frequent occurrence of foaming at the mouth, and severer affection of the respiratory muscles; the more leaden appearance of the countenance, and the more common recurrence of the paroxysm at a stated time, than in convulsions, particularly after the first sleep, or when the patient awakens or is rising in the morning. (See *EPILEPSY—Diagnosis*.) *β*. Convulsions are readily distinguished from *hysteria*, by the antecedent copious discharge of pale urine, the globus hystericus, and the borborygmi; and by the alternate crying and laughing attending the seizure of the latter. Some instances of simple convulsion, arising from irritation of the female organs, will, however, very nearly approach, if not altogether run into, the hysterical character; as we also see many cases of puerperal convulsion differing but little from epilepsy, excepting in the frequent recurrence of the paroxysm in the former before the patient has recovered from the sopor consequent upon the antecedent fit, and in one or two of the diagnostic signs noticed above. *γ*. The continued or permanent nature of the spasms in all the forms of *tetanus*, and the absence of any tendency to obscuration of the general sensibility and mental faculties, during the whole unremitting duration of this dreadful disease, are sufficient diagnostics between it and convulsions. *δ*. *Rabidity* cannot be mistaken for this affection, if the history of the case, the uncommonly increased sensibility of the whole frame, the dread of fluids, and unimpaired cerebral functions, characterising rabies, be attended to; for, although convulsive seizures occur frequently in it, they are produced by so slight external or mental causes — by every attempt at swallowing liquids — that their nature and origin cannot be for a moment doubted. (See *RABIDITY*.)

36. III. TERMINATIONS OR CONSEQUENCES, AND PROGNOSIS.—*A*. Convulsions, in any of the forms now placed before the reader, may terminate, (*a*) in health; (*b*) in some other disease; or, (*c*) in immediate dissolution. *a*. Their termination in health may be marked by no peculiar phenomenon; beyond the non-recurrence of the seizure. In other cases they are followed by critical evacuations, particularly hæmorrhage from the nose, mouth, or ears, after which they may never recur, or which may produce an immunity from them for a time. Vomiting and diarrhoea, or the accession of the catamenia, may likewise prove critical.

37. *b*. They often are followed by other diseases;

or rather the original disorder or change of structure, of which convulsions are merely a part of the sensible and outward signs, may, from its increase, or extension to adjoining parts, occasion other or additional phenomena more or less intimately allied to convulsion, as palsy, apoplexy, coma, loss of speech or of sight or hearing, chorea, or mania, delirium, idiocy, &c., each of which may pass into the other, or be variously associated with one another. Thus loss of sight, hearing, speech, and idiocy, may be the consequences in the same case. Also, either of these consecutive phenomena may arise from the cerebral congestion, and its effects, produced by the frequent recurrence or by the severity of the fit, particularly when the respiratory functions are much impeded in it, and the system is plethoric and relaxed. My limits will not admit of illustrations of these facts, either from my own experience, or from the other sources which are referred to at the end of the article; but they are of common occurrence, and may, after continuing for a longer or shorter time — in some cases for many years — in others for a very short period, either be recovered from, or terminate existence. In some cases, convulsions are followed by a state of leipothymia, trance, or complete syncope, which, when profound and continued, may be mistaken for dissolution, and endanger premature interment. There is reason to suppose that, in some countries where interment usually follows death at a much shorter period than in Great Britain, this dreadful fate has overtaken the patient. In other instances, lethargy, or torpor, terminates the paroxysm, which, in rare instances, has been of long duration, and also may be mistaken for death. Whilst the convulsions of childhood more commonly give rise to, or terminate in, loss of one or more of the functions of sense, in chorea, in idiocy, or in hydrocephalus; those attacking adults are more disposed to pass into either apoplexy, coma, palsy, or mania: and whilst the convulsions of the former class of subjects are more frequently the consequence of irritations affecting the abdominal viscera, those of the latter, excepting in females, are more generally the result of disease within the cranium or spinal column, often at a certain stage of its progress.

38. *c*. Their termination in death takes place either through the intervention of one or more of the diseases noticed above as their consequences, or, more directly, from the extension of convulsion or spasm to the respiratory muscles, inducing asphyxy, or from an overwhelming congestion or effusion of blood in the brain. This sudden unfavourable change more commonly occurs in puerperal convulsions than in other forms, excepting when they proceed from abscesses or tumours within the cranium. Death may also occur from accidental suffocation during the paroxysm.

39. *B*. The PROGNOSIS of convulsions depends chiefly on what is known of their causes, on the antecedent and consecutive phenomena, on the history of the case, and the degree in which the functions of the brain and nervous system are affected during and after the fit. *d*. If the convulsions occur in children, without fever or any primary or cerebral disturbance, and apparently from worms, disorder of the prima via, &c., a favourable opinion may be entertained.



But when they are preceded by head-affection, by fever, followed by strabismus, stupor, or loss of one or more of the functions of sense; when they are prolonged or recurrent; or are followed by signs of any of the unfavourable terminations noticed above, much *danger* should be apprehended. Indeed, all cases depending upon cerebral disease are attended by more or less danger, which in some instances become most imminent, particularly when the symptoms of hydrocephalus are present. *b.* In *adult persons* the prognosis is equally *unfavourable*, when the affection is evidently the result of cerebral disease, or of organic changes—and when the fits become more and more frequent, or severe, with more marked cerebral disturbance either attending upon or following them. On the other hand, when they are symptomatic of disorders of the *prima via*, or of the generative organs, a *favourable* opinion may be entertained. *c.* *Puerperal convulsions*, however, should never be considered devoid of *danger*, more especially when they occur after delivery; or in consequence of great exhaustion of vital power, or of uterine hæmorrhage. When they are slight, are unattended by stertorous breathing, or by paralytic or apoplectic symptoms, and when parturition is so far advanced as to readily admit of its completion by art, less danger may be feared. But the *prognosis* of convulsions generally must be inferred from a careful review of the diversified circumstances of individual cases, especially in respect of their remote and efficient causes, and of their disposition to terminate in either of the ways pointed out.

40. IV. APPEARANCES ON DISSECTION OF FATAL CASES. (See BRAIN, § 4—133.), EPILEPSY, and SPINAL CHORD.

41. V. REMOTE AND EFFICIENT CAUSES.—*i.* The *remote causes of convulsions* are numerous; but they often require a certain *original* or *acquired predisposition* of system to ensure their operation; and various influences which may only predispose to them in some persons, may even excite them in others. *A. Predisposing.* There is every reason to suppose that the offspring may derive constitutional predisposition to convulsions from the parents. Persons of a nervous and irritable temperament,—of a delicate frame, and largely developed head (DESESSARTZ),—of a relaxed and soft fibre, and plethoric vascular system,—children whose fontanelles are very late in closing,—those who are naturally of a quick, sensitive, and unstable disposition, and whose physical and moral constitutions are readily impressed,—are predisposed by original conformation. Those infants who have experienced injury of the cranium during parturition (SMELLIE); persons who have early, prematurely, or inordinately indulged in venereal pleasures—who have placed no restraint on their passions, particularly anger,—who have become debilitated by any cause (AUTENREITH);—who have had their cerebral organs unduly and too early excited, and before the process of development was sufficiently far advanced; the present state of civilisation and precocious mental improvement; the greater irritability of the system accompanying the epochs of dentition; the irritable and plethoric states attendant upon pregnancy; habitual determination of blood to the head;

previous attacks of convulsion, either before or after puberty, or in a former pregnancy; attempts to conceal pregnancy, and the mental distress and shame attending it in unmarried women; exhaustion of nervous or vital power by increased discharges, long continued pain, or want of sleep; all luxurious indulgences; too much sleep; inanition and want; prolonged lactation; fluor albus, &c.; and certain electrical states of the air, by which the nervous system is influenced, and rendered more susceptible of impressions and excitement; are the chief causes which generate a predisposition in the frame. It has been remarked by Dr. RAMSBOTTOM, and other writers, that puerperal convulsions were most frequently produced during warm electrical states of the atmosphere.

42. *B.* The *exciting causes* of the various forms of convulsion are very numerous; and they act in different ways in producing their effects. I have already stated, that irritation of a part of the organic or ganglionic nervous system will be transmitted by the communicating branches to the spinal nerves, and produce convulsive actions of the muscles they supply, without the brain experiencing any evident lesion; whilst, in other cases, the irritation may be conveyed to the brain, either directly by the organic nerves, or through the medium of the spinal chord, the cerebral functions suffering accordingly. But irritation or organic change of any of the parts contained within the cranium will also occasion convulsions, the general sensibility and mental manifestations being then more or less obscured or perverted during the paroxysm or subsequently. These facts, which might be illustrated by numerous cases, the history and results of which I have attentively observed, naturally point to a division of the causes, *first*, into those which act upon some portion of the organic nervous circle, or the viscera which it supplies; and, *secondly*, upon the cerebro-spinal system itself. But, although it is useful to make this distinction, particularly for practical purposes, yet it should not be overlooked, that irritations affecting the former would rarely be followed by convulsions, unless the latter possessed a marked disposition to disease, as far as regards increased susceptibility and proneness to experience alterations from the healthy condition of its circulation.

43. *A.* The exciting causes which act more immediately upon the *organic nervous system*, and through it upon the spinal nerves or brain, or both, are the following:—*a.* In *infants and children*, the retention of the meconium; a morbid state of the umbilical chord; unwholesome milk, or improper feeding; acid or acrid sordes, and various diseases of the alimentary canal; an overloaded stomach; suppression or retention of the urine; accumulated flatus, or morbid secretions, and the presence of *worms*, occasioning irritation of the bowels; the ingestion of acrid substances—as very irritating purgatives (GOHL and LENTILIUS), or emetics (RIEDLIN),—acrid enemata; noxious or indigestible substances taken as food; acidity of the *prima via*; dentition at either of its epochs, particularly cutting the eye and molar teeth; the irritation of pained or carious teeth; and calculi in the urinary organs, &c. *b.* In persons about, or *subsequently to, puberty*, and occasionally in children, organic diseases of



the stomach, bowels, or collatitious viscera; affections or lesions of the heart; constipation, colic, ileus, and intus-susception; incarcerated or strangulated hernia (GRAAF and myself); organic change of the kidneys, and suppression of urine; manustupratio or inordinate sexual intercourse; and nervous and vascular excitement, or other diseases of the female organs, particularly the ovaria and uterus. *c.* In *puerperal females*, a loaded stomach, or disorder of this organ brought on by indigestible or unsuitable articles of diet, particularly shell-fish (CLARKE); rapid or premature distension of the uterus during pregnancy; long continued and exhausting labour; excessive, frequent, and inefficient pains; distension of the urinary bladder during or after parturition; a loaded state of the bowels; excessive depletion or flooding; venereal indulgences during the last two months of utero-gestation.

44. *B.* The causes which act more directly on the *cerebro-spinal nervous system* are, *a.*, the improper exhibition of narcotics, and of spirits and various quack medicines, by the lower classes, to *infants and children*; the admission of a strong light, or the impression of loud noises, on very young infants; the continuance or excess of pain; injuries received on the head during or subsequently to birth; fear, and sudden fright, or fearful dreams.

*b.* In *adults* more especially, and in children also, the most common causes of this description are, the influence of imagination and imitation; the action of the sun's rays on the head; excessive mental labour or anxiety; extreme bodily sufferings, or long watching; injuries of the brain, spinal chord, or nerves; irritation of nerves by tumours, abscesses, or by ligatures in operations, or injuries of them by wounds and accidents; incipient curvatures of the spine (WICHMANN, BONNET); the impression of excessive or long continued cold, or of a cold bath; the influence of particular odours on some constitutions; the abuse of spirituous liquors; the influence of various poisonous substances on the nervous system, belonging to the animal, vegetable, and mineral kingdoms, as *nux vomica*, and nearly all the class of narcotics; deleterious gases and metallic fumes, as the nitrous oxide, sulphuretted hydrogen, &c., the vapours of mercury and lead; and the irritating and inflammatory operation of many mineral preparations and acrid vegetables (see POISONS); all emotions of the mind which excite the nervous power, and determine the blood to the head, as joy, anger, religious enthusiasm, excessive desire, &c.; or those which greatly depress the nervous influence, as well as diminish and derange the actions of the heart, as fear, terror, anxiety, sadness, distressing intelligence, frightful dreams, &c.; numerous lesions of the encephalon or its membranes, particularly effusions of fluid, abscesses, tumours, ossific deposits, and various other adventitious formations—indeed, nearly all the organic changes described in the articles on the BRAIN, EPILEPSY, and SPINAL CHORD; also exhaustion from previous disease, particularly by large losses of blood (SCHROEDER); inanition and want (AMATUS LUSITANUS); the erect position suddenly assumed; lightning (GRAPENGIESSER); abscesses about the neck; the suppression of eruptions and discharges, particularly on the head or from the ears; the syphilitic poison; and repulsion of gout or rheumatism. *c.* In *puerperal females*, many of the

causes now mentioned are especially productive of convulsions, particularly anxiety or distress of mind in unmarried females; violent straining during labour; and sudden changes from the horizontal to the sitting or erect postures.

45. *ii.* The *efficient causes* have been partially alluded to. Their nature may be in some measure inferred, from what has been stated above. It seems evident, from a careful consideration of the exciting causes, of the character and progress of the symptoms, and the lesions usually detected on dissection, that convulsions arise from several pathological states, the grosser or more palpable parts of which only we are enabled to recognise by the senses; and that, in addition to these, a certain susceptibility of the nervous system, particularly of the cerebro-spinal centres, is requisite, nevertheless, to the full development of the seizure. It is extremely probable that convulsions frequently arise from some considerable change in the state of the circulation within the cranium; and that such change may be either active cerebral congestion,—in some cases connected with general plethora, but in others not thus associated, and, even in a few, accompanied with marked deficiency of blood,—or local or general anæmia. Moreover, it may be presumed that the seizure very often is accompanied with but little disturbance of the cerebral circulation or functions at its commencement; and that it chiefly depends upon irritation, in some manner induced in the organic nerves, and, through them, in the spinal nerves, either partially or generally. We have no proof of the circulation of even the spinal chord or its membranes being disordered in these cases, although it may be affected in convulsions, either primarily or consecutively. In cases which more manifestly proceed from disease within the cranium, and that of an organic kind, as from tumours, abscesses, aqueous effusion, &c., it by no means follows that the circulation in the brain is generally, or even at all, either accelerated or congested, although these lesions may safely be assumed in many instances. In some cases even of organic change, the general amount of circulation in the head seems, as far as we can judge from symptoms, much below the natural standard, and yet convulsions will supervene; whilst in others, signs of inflammatory action of the membranes are apparent. In many cases, moreover, judging from the states of pre-existing disease, from what is known of the operation of various causes, and from the symptoms connected with the head,—the weak and small pulsation of the carotids, the antecedent fainting or leipothymia, the low temperature of the scalp, and pale, sunk, and pinched features,—it may be inferred that the vital endowment and the circulation of the brain are momentarily deficient both in activity and in quantity.

46. Therefore, while I subscribe to the justice of the aphorism of HIPPOCRATES, that convulsions arise from repletion or inanition as respects the circulation within the cranium, I would qualify it, and add, that they often originate thus, but that either of these states forms a part only of the changes that produce them, even when most irrefragably present,—that in many cases the circulation in the brain is not materially disturbed, whilst the spinal nerves are affected either by irritation conveyed to them from the organic nervous system or from the spinal chord itself, more



frequently the former,—that even when the brain is disordered, general convulsions will arise only when the disorder extends to, or influences the parts more immediately related to, the locomotive actions of the body, as the spinal chord or its membranes,—and that we cannot contemplate the origin of convulsions in any way, and leave out of view changes primarily induced in the organic nervous or ganglial system—which changes will more readily produce, than be produced by, disordered circulation in the cerebro-spinal organs. We know that the movements of the fœtus in utero are automatic—are the consequence of irritations affecting the organic nerves, extending to the spinal nerves, and, through them, inducing motions of the limbs. To the production of these, any change in the brain or spinal chord is not required; and a great many cases of convulsion have a similar origin, the difference being only as to the grade of irritation relatively to the susceptibility of the patient, and to the effect produced. As to the opinion entertained by the older humoral pathologists, from GALEN to WILLIS, that a morbid state of the fluids also occasion convulsions, some importance may be attached to it. We do not, however, find convulsions much more prevalent when the blood is manifestly morbid, unless in those cases where a previous, and, at least, an equal change has been produced upon either the organic, or the cerebro-spinal nervous systems. The convulsive movements that occur in common and pestilential cholera, in malignant fevers, in rabidity, and in organic lesions of the kidneys, with suppression of urine, are proofs of this position. That, however, a morbid state of the blood sometimes constitutes a concurrent proximate cause of certain diseases, in which convulsions either incidentally occur, or form a part of the circle of advanced phenomena or effects, may be admitted, in the absence of sufficient evidence to the contrary; for, when the blood itself is primarily changed, we may with reason infer that convulsions will sometimes manifest themselves as a part of the effects thereby produced upon the nervous system; but I believe that convulsions seldom arise from this cause only.

47. VI. TREATMENT. — i. OF CONVULSIONS GENERALLY. The means of cure in all cases of convulsions, are directed with the view, 1st, of subduing the fit, when called to a patient labouring under it; and 2d, of preventing its return. A. To subdue the paroxysm, it is necessary to have prompt recourse to active measures: but these should not be employed indiscriminately, and without taking quick cognizance of the cause, and the existing pathological states, as far as they may be readily ascertained. The circumstances principally to be observed by the practitioner, are the presence or absence of active cerebral congestion and sopor, the existence of general vascular plethora, the temperature of the head and lower extremities, the pulsation of the carotids, and the character of the countenance and of the convulsive motions. These may be ascertained in a very few moments, and at the same time that enquiry is being made into the cause of the seizure, and the peculiarities of the case, as respects the age, constitution, and habits of the patient.

48. a. A person in convulsions ought to be placed so as to breathe an open cool air, and to facilitate the restoration of one of the earliest

functions disordered; and no more attendants be permitted than are absolutely necessary. Those susceptible of, and liable to, nervous affections, should not be allowed to remain in the same room, or even in the same house, with the patient while in the fit.—b. When the habit of body and the cerebral symptoms, &c. present no contra-indication, *general or local blood-letting*, or both, should be resorted to, and carried as far as circumstances may warrant. When the cerebral congestion is very active and extreme, the jugular vein may be opened; but the depletion should never be pushed too far, with an expectation of stopping the convulsions; nor should it ever be carried to deliquium, for the system may be thereby injured, and a return or immediate recurrence of the seizure be favoured by it. *Revulsive bleedings*, as from the feet while they are held in warm water, may be preferred, if the seizure be connected with difficult or suppressed menstruation. *Local depletions*, in other instances, are best practised by cupping behind the ears, particularly in children, and upon the nape of the neck, and between the shoulders. In other instances, when the brain is not affected,—when the head is cool and the carotids are pulsating neither more fully nor more strongly than natural,—the state of the spinal column should be carefully enquired after, by pressing a warm sponge along and between the vertebræ; and the abdominal regions and the evacuations ought to be daily examined. If signs of inflammatory action exist in either of these quarters, particularly if they be connected with plethora, general and local depletion—preferably the latter, when plethora is wanting—should be resorted to. But there are many cases, especially those produced by copious evacuations, by inanition, and the exhaustion of painful and protracted disease, where depletion would be most injurious; and there are intermediate grades, in some of which local blood-letting might be either beneficial or of no advantage, according as the case approaches nearer to the one extreme than the other. When the convulsions are *partial*, then local depletions are to be preferred.

49. c. There are certain states of convulsion, in which it at first seems difficult to determine as to the propriety of resorting to blood-letting in any way. One of the most common of these, is that characterised by a pale and somewhat sunk countenance, and by tonic convulsions. This appearance may mislead the practitioner, if he do not examine carefully into other symptoms. If, in addition to these, the carotids pulsate strongly, the temperature of the head be increased, the pupils contracted, and the brows knit, we should suspect inflammatory irritation of the arachnoid—notwithstanding the absence of all plethoric or sthenic signs—and resort to depletions, and the means about to be noticed. (See also BRAIN — *Treatment of Inflammation of its Membranes*.) Another state sometimes occurs, with very violent general convulsions; a broad, open, throbbing, and frequent pulse; pale countenance and surface, often with sopor or delirium, or both. These symptoms may mislead the inexperienced, and depletions—occasionally the very cause of the mischief—may be improperly employed to relieve it. But when the history and symptoms of the case are more minutely examined, we shall



find precisely that state which is described in the article BLOOD (§ 53—60.), and that, instead of congestion, there is general anæmia, with cerebral irritation, combining with the physical condition of the brain, to determine to it the greater part of the blood in the system. In other cases, there is apparently anæmia of the brain, at least at the commencement of the fit, and either consciousness is retained, or it is lost from the state of the cerebral circulation. These forms of seizure may be called *anæmial*; inasmuch as they arise either from a general deficiency of blood, or from anæmia of the brain, although the vessels of this organ soon become partially congested from the impeded respiration, and interrupted circulation through the lungs and heart, at the commencement of the paroxysm. In these, a very opposite treatment to depletion is required. The observations of LATHAM, HALL, GOOCH, NORTH, and the author, on this important practical topic, have, however, induced the practitioners of the present day to resort to blood-letting in convulsions in a much more discriminating manner than formerly.

50. *d.* Next in importance is the judicious employment of *cold* and *heat* — of cold in the form of cold affusion on the head and spine, and of heat in that of warm bath or semicupium. An appropriate use of these is more generally serviceable, and often less dangerous, than depletions. The *cold affusion* to the head, and, in cases where there seems to be irritation of the spinal envelopes, along the vertebræ; and cold, in the form of epithems, evaporating lotions, pounded ice to the head, when convulsions are produced by inflammatory action in the brain or spinal chord; are among the chief forms in which this agent is admissible. The *cold bath*, although advised by CURRIE, LOEFFLER, BEAUMES, BAYNARD, and others, is, in my opinion, a hazardous experiment during the paroxysm, and sometimes even in the interval. The *warm bath*, or *semicupium*, is frequently of much service, and particularly when there is either high nervous irritation, a dry harsh skin, or cold surface or extremities; and my experience accords with that of HEILBRONN, HENRISCHEN, DOERNER, and STUTZ, respecting the propriety of adding a quantity of the fixed alkalies, or their sub-carbonates, to the water. When the head is much affected, either by inflammatory irritation of the membranes or active congestion, cold affusion, or cold epithems or lotions, may be employed whilst the patient is in the warm bath, or is using the semicupium or pediluvium. In slight cases of convulsion, the aspersion merely of cold water over the face, head, or neck, is often of service. Large draughts of cold water were recommended by HOFFMANN; and they, as well as water ices, and cold clysters, have been several times employed by myself with much benefit. Cold injections are praised by LANGHANS and MARX. Cold affusion, cold aspersion, and cold epithems, have been prescribed by CURRIE, DUPONT, DOEMLING, and others; but the two former were usually directed by them to the surface generally, instead of to the head, — a circumstance which accounts for the disuse into which it had fallen, when the practice was revived some years since by the author.

51. *e.* If the patient can swallow, and the muscles of the jaw are not much affected, *cathartic*

medicines should be given by the mouth; but in most instances it will be preferable to delay them until after the seizure. But I have under no circumstances been prevented from directing a cathartic and *antispasmodic* enema to be thrown up. Either of F. 131—136. may be employed and repeated, if it be not retained, as is frequently the case. When purgatives can be taken, a full dose of *calomel*, either alone or with jalap, followed soon afterwards by an active cathartic draught or mixture, consisting of senna, tincture of jalap, carminatives, and antispasmodics, particularly the preparations of ammonia and camphor, is, upon the whole, the most appropriate. But under every circumstance the operation of these should be promoted by enemata. When we wish to produce an active derivation from the head and spine, as well as alvine evacuations, the croton oil, elaterium, ol. terebinthinæ, &c., may be employed. But, where the object is chiefly to bring away offending secretions, and other causes of irritation, and at the same time to allay disordered action in the *prima via*, calomel, jalap, rhubarb, and senna, are, perhaps, the best purgatives we can employ. Their action will, in all instances, be much increased, and a marked change be often produced in the disease, by an occasional dose of the ol. terebinth. and ol. ricini, assisted by the enemata already recommended. If convulsions arise from *worms* in the intestines, *anthelmintic* purgatives, during both the paroxysms and interval, should not be omitted. Calomel may generally, with due address, be exhibited during the fit, and subsequently other anthelmintics may be given. BERGIUS and BARTON prefer the *Spigelia Marylandica* in such cases; but the other means adopted in verminous disorders may be employed according to circumstances. *Emetics* are sometimes of service, when exhibited upon the first intimation of the seizure, particularly if there be indications of gastric irritation from offending or noxious ingesta, and acid sordes, or if the paroxysms assume a periodic form. SCHENCK, SCHAEFFER, RIGEL, CONRADI, HUFELAND, and SMITH, advise them chiefly in such cases. THOM recommends them to be exhibited to the nurse, when convulsions attack infants.

52. *f.* *Antispasmodics* are sometimes productive of instant relief, when employed in large doses, early in or upon the first intimation of the fit, particularly when it arises from debility, or irritation in the *prima via*, or morbid nervous susceptibility; but they seldom can be taken in the paroxysm, unless it be slight; or arise from exhausting causes, and then they are often of great service, especially if they be combined with restoratives and opium, conium, or hyoscyamus. The æthers, camphor, musk, assafoetida, valerian, the preparations of ammonia, bismuth, zinc, &c., are amongst the most efficacious in these cases. When inflammatory irritation seems to exist in the membranes of the brain, they are obviously contra-indicated; but congestion of a passive nature, especially when the pulsations of the carotids are not strong or hard, and the temperature of the head is not increased, should be no reason for omitting them. An extensive experience, however, of the effects of the spirit of turpentine in convulsive diseases, has convinced me that it is the most efficacious



and the safest antispasmodic that can be employed for their removal. If it be given in doses so large as to act as a purgative, and seldom or rarely repeated, it is remarkably beneficial in the cases which arise from cerebral congestion or irritation; but when the seizure is connected with anæmia, or exhausted vital power of the brain, or general debility, it ought to be exhibited in small doses, often repeated, and be combined with restoratives and aromatics. MICHAËLIS, SCHMALZ, ALBERS, HARGENS, CONRADI, HEILBRONN, and WIEDEMANN, strenuously advise, in all convulsive affections, large doses of the *fixed alkalies*, either alone or alternated with *opium*. Of the antispasmodic action of these substances, as well as of their soothing operation on the digestive mucous surface, there can be no doubt. If the convulsions arise not primarily from organic disease within the head, I believe that opium thus combined will often be of great service, and particularly when they proceed from the nervous susceptibility and muscular irritability often connected with debility, exhaustion, and excessive evacuations. The good effects of alkalies in disorders of the digestive functions, and the frequent origin of convulsions in these disorders, or their connection with them, must be admitted. Moreover, the alkalies, combined with opium, or hyoscyamus, conium, or belladonna, and ipecacuanha, &c., are among the surest means we possess of allaying irritations affecting the nervous system. STUTZ, BRUNINGHAUSEN, DOERNER, and HENRISCHEN, employ them also in fomentations to the abdomen, in baths, and in enemata; they using an ounce of the caustic alkali to about a quart of water for the fomentation. I have prescribed the alkalies frequently and largely in the convulsions of children with much benefit. Other antispasmodics, and different modes of applying those in common use, have been adopted by various writers; but as these are better suited to fulfil the second intention of cure, I will notice them hereafter.

53. *g. Anodynes and narcotics* are often of the most essential benefit, when appropriately prescribed and combined, or preceded by other suitable remedies. They are seldom of service in the convulsions proceeding from active congestion and organic disease within the head; but when the affection is connected with irritation in other parts, or when the disorder of the brain or its membranes consists chiefly of irritation, they should not be omitted. They are seldom of use, — sometimes even injurious, in puerperal convulsions, and ought to be given with caution to very young children. In cases where the propriety of exhibiting them is doubtful, any unpleasant operation will be prevented by combining them with camphor, or with aromatic tinctures or spirits. I have derived great advantage from employing them *externally*, selecting for this purpose *opium* or *belladonna*, in the form of embrocation or plaster—generally the former—applied during the paroxysm, over the epigastrium and abdomen, and combining them with rubefacient and stimulating substances, as camphor, ammonia, Cayenne pepper, &c., or with any of the liniments or plasters in the *Pharmacopœias*, or in the *Appendix*, suited to the case (F. 108. 297. 307.). The practitioner should, however, be cautious in the employment of the more active

of these narcotics, even externally, as very dangerous effects have resulted from them. Dr. THACKERAY found that *tobacco* steeped in brandy, and placed over the epigastrium, produced a most dangerous state of vital depression.

54. *h. Revulsants and counter-irritants* are of great service in all states of the disease accompanied with cerebral congestion, or irritation of the membranes of the brain or spinal chord. Sinapisms to the extremities; rubefacient liniments (F. 299. 305.), and embrocations, particularly those with Cayenne pepper, horseradish, &c.; the turpentine fomentation; the immersion of the hands and feet, or the lower extremities, in a salt and mustard bath; *dry cupping* on the nape of the neck, occiput, between the shoulders, or along the spine; are the preferable means of this description. These will often, of themselves, shorten the seizure; but if they fail of having this effect, after slight redness of the skin has been produced, advantage will frequently arise from placing over it a liniment or embrocation containing opium, or the acetate or muriate of morphine, or any of the other anodynes in use, either of which may also be employed in the form of plaster, combined with antispasmodics, &c.

55. *i. Convulsions arising from exhaustion, hæmorrhagy, inanition, &c.* require restoratives, stimulants, &c. in small quantity, and frequently exhibited, with strict attention to the temperature of the head, which should be lowered whenever it rises above natural, by cold applications. (See ABSTINENCE—*Treatment of*; and BLOOD—*Deficiency of*, § 48, 49.) The combination of hyoscyamus with gentle tonics; the preparations of opium, conium, or hop, with those of ammonia and camphor; the preparations of valerian or assafoetida with the sub-carbonates of the alkalies; the muriate or acetate of morphine, with the aromatic spirits and tonic tinctures; and emollient and antispasmodic enemata, are most appropriate to those cases. In these, as well as in the more clonic forms of convulsions, the preparations of iron, particularly the *ammonia-tartrate of iron*\*, alone or combined with hyoscyamus, will be of much service. The occurrence of these affections towards the close of *febrile* or *acute diseases* (§ 13. 33.), particularly when they manifest signs of greatly depressed vital power, requires nearly similar remedies, or such as exert a still more stimulant and antispasmodic operation. The sulphate of quinine, with hyoscyamus and camphor; the decoction of cinchona, or infusion of arnica or serpentaria, with liquor ammoniæ acetatis and æther; warm negus, with aromatics; and stimulating embrocations or liniments over the epigastrium, may be resorted to in these cases. If convulsions occur in the *course*, or towards the *crisis of fevers*, the treatment must altogether depend upon the state of the cerebral functions, and the disposition that may be evinced towards spontaneous or critical evacuations, to the promotion of which our means should be directed; taking care, at the same time, to guard the head from mischief, by employing local depletions, cold affusion, cold

\* A most valuable and beautiful preparation very lately introduced by Mr. AIKEN; and from its very pleasant, sweet taste—resembling that of liquorice—extremely well adapted for children. Dose from half a grain to five or six grains.



epithems, and internal and external revulsants, if it exhibit appearances of congestion or inflammatory irritation; and warm diaphoretics, gentle tonics, and antispasmodics, and other means of supporting the manifestations of vital power in the nervous systems, and of promoting the secreting and excreting functions.

56. *k.* When convulsions are produced by narcotic or acro-narcotic poisons, the immediate evacuation of the noxious substance by the stomach pump, or by emetics, the cold affusion on the head, followed by stimulants and antispasmodics, green tea, or coffee, stimulating enemata, and frictions of the surface, are chiefly to be depended upon. If they proceed from the fumes of lead or mercury, antispasmodics, tonics, stimulants, strychnine, or nux vomica, with purgatives, are most serviceable, particularly when assisted by the warm bath, and by frictions of the surface afterwards with stimulating liniments. *Serpentaria*, the *arnica montana*, and camphor, are often beneficial remedies in those cases.

57. *l.* Convulsions either of a partial, a general, or irregular and anomalous form, arising from irritation of the female organs, require local depletions, cooling aperients, and antispasmodics; the internal use of soda and nitre; cold clysters; the cold affusion or aspersion; the tepid bath, or the shower bath, while standing in warm water; and draughts of cold water. In a case of general convulsions arising from inflammatory irritation about the neck of the uterus, with leucorrhœa, I directed the patient to take a lemon ice, or to drink as much as she could of cold spring water upon the intimation of the seizure; and she has hitherto done so with uniform benefit. Having seen her during the paroxysm, and perceiving that she retained her consciousness, cold water was given, and swallowed with some difficulty. The benefit was almost instantaneous. If the convulsions be connected with difficult, or suppressed menstruation, general or local depletions, and afterwards the warm general or hip bath, full doses of the preparations of assafoetida and ammonia, particularly the spir. ammon. succin., the spir. ammon. fœtid., or the spirit. guaiaci ammon., also camphor and the boracic acid, or the sub-borate of soda, have proved the most effectual remedies in my practice. But the means already advised to prevent congestion or irritation within the cranium should be resorted to upon the first intimation of the fit. Bleeding by leeches from the inside tops of the thighs are indicated in these cases; but it can be practised only in the interval.

58. *B.* The prevention of the paroxysms is to be attempted, with due attention to the remote and proximate causes, the former of which should be removed as completely as possible, and the latter energetically but cautiously combated; recollecting always that convulsions are the outward manifestations of certain lesions of the nervous, acting on the muscular, functions; and that our knowledge of such lesions extends not beyond the inference that they consist of depression or exhaustion of vital power, or of irritation, or of congestion, and, occasionally, of two or all these states conjoined, some one of them predominating over the others, and being associated with additional, and even opposite changes: Many of the

means already noticed are requisite in the intervals, as well as in the paroxysm, especially when judiciously modified to the circumstances of the case. *a.* Vascular depletion is often required, and in similar states of disease to those already pointed out; but it should be directed with great circumspection, and to a moderate extent, unless the signs of active cerebral congestion, or of inflammatory irritation, or of general plethora, be unequivocal. If, however, opposite states obtain, viz. exhaustion, and deficiency of blood, very different means must be employed. In most instances of convulsions, the quantity of the circulating fluid is not so frequently either much above or much below the usual proportion, as the influence,—vital or nervous, or by whatever name it may be called,—by which the distribution of blood throughout the frame is regulated, is disturbed so as to determine or attract a larger proportion to one part than to another. In no peculiarity of constitution is the old doctrine, "*ubi irritatio, ibi fluxus*," more frequently illustrated than in that in which convulsive complaints are most commonly observed; and, in these diseases, we are continually finding fluxion one of the earliest consequences of irritation. I have long thought, and on several occasions contended, that, in the common routine of practice, blood-letting is too indiscriminately employed to remove such determinations or irregular distribution of the circulating mass; and that, although it sometimes succeeds, owing to its being associated with other and more appropriate means; it often fails, or even augments the mischief, by increasing the debility and susceptibility of impressions from exciting or irritating causes, that generally characterises the nervous system of persons subject to convulsive seizures. Therefore, when the abstraction of blood is really necessary, it should be performed in such a manner, and be accompanied with, or followed by, such medicines as are most likely to equalise the circulation; and it is chiefly in this way that many of those about to be noticed are productive of any service in the disease. Local depletions, in moderate quantity, repeated according to circumstances,—from the nape of the neck or occiput, when the head is affected, and along the spine, if irritation of the membranes of the chord is suspected,—and assisted by such other means as the case may require, are more generally applicable in the intervals than large venæsections.

59. *b.* There are few remedies more beneficial in convulsions than mild purgatives, or aperients, taken daily, and conjoined with tonics and antispasmodics. Active purgation, if long persisted in, will lower the vital energy, and thereby favour the return of the fits; but the more deobstruent and eccoprotic medicines of this class, particularly when thus combined, may be given, so as to procure two or three fœculent evacuations daily. Thus prescribed, purgatives will increase the patient's strength, and often procure a prolonged immunity from the seizures. *Aloes*, with quinine or iron, and camphor; or with myrrh, assafoetida, the tonic extracts, &c., and occasionally with blue pill, or with extract of hop, hyoscyamus, or conium (F. 450—471.); *senna*, with gentian or bark, the preparations of ammonia, æther, &c. (F. 266:872.); and either



of these with the liquor potassæ, or the alkaline sub-carbonates, are most to be relied on. But advantage will accrue from changing the forms and mode of combination and exhibition of purgatives from time to time, and from assisting them with such other remedies as the special characters of the case may require. A full dose of calomel, followed by the turpentine draught (§ 51.), may occasionally be resorted to; and enemata will also be of service. In every instance, the appearance and quantity of the discharges, intestinal and urinary, should be examined; and when the sensibility of the bowels seems to be increased, oleaginous or mild purgatives, with alkalies and hyoscyamus, ought to be preferred. MORGAGNI recommended, as an aperient, two ounces of the ol. amygdal. dulc. to be taken every night,—a medicine well suited to cases of this description; but the ol. olivæ, ol. lini, or the ol. ricini, and even the cod or tusk-liver oil, may also be thus used. Where we find the tongue much loaded or furred, active purgatives, particularly full doses of calomel, with cathartic extracts, &c., are especially required in the first instance; and mild laxatives, with tonics and antispasmodics, subsequently.

60. *c.* In many cases, particularly when the convulsions proceed from inflammatory irritation of the membranes of the brain or spinal chord, *bleeding* and *purgatives* will be advantageously followed by an *alterative course of mercury*, pushed as far as to affect the gums, and by low diet. Much tact is, however, required in determining as to the cases and period of treatment, in which this practice should be adopted. It is admissible only when the disease proceeds from the pathological state just mentioned, or is connected with a syphilitic taint, or has originated in the abuse of spirituous liquors, &c., and the too great indulgence of the appetite for food; and it will be injurious in cases of exhaustion, unless combined with active tonics and nutritious diet. PLUMMER'S pill, the hydrarg. cum creta, or the blue pill, may be given, in small and frequently repeated doses (from half a grain to a grain of the last, thrice a day), with anodynes, as conium, hyoscyamus, ext. humuli, and small quantities of camphor. In more doubtful cases, or when we suspect that effusion of fluid has supervened upon disease of the membranes, the corrosive sublimate may be prescribed, either in the compound tincture of cinchona, or with the compound decoction of sarsaparilla, or diuretic infusions or spirits, according to the symptoms and circumstances of the case.

61. *d.* Various *antispasmodics* and *tonics*, besides those already adduced, have been directed, chiefly in the intervals; and others in more common use have been employed in novel forms. The *cuprum ammoniatum* has been prescribed by HOME, DUNCAN, and BIANCHI; the *nitrate of silver*, by POWELL and HALL; the *animal oil of dippel*, by HERZ; the oil of *rue*, by ABRAHAMSON; *cajeput oil*, by THUNBERG; the *mistletoe*, by COLBATCH and HOME; and the preparations of *zinc*, by GOODSIR, BELL, BEAUMES, DUGUID, WHITE, and many more. KREBS has advised the trunk of the body to be enveloped in *camphorated cloths*, if we suspect convulsions to arise from intestinal worms. WARBURG has recommended *musk* in large doses, combined with *nitre*; and SIDREN and FRANKFURTER the internal use of

*nux vomica*, apparently upon the principle of HAHNEMANN, that *similes similibus curantur*. CAZALS directed about half a drachm of *bismuth* to be taken in the twenty-four hours, with *castor*. VOGEL thought that benefit has been derived from the flowers of the *white lily*; and BAKER, PALLAS, THOM, and HOME, entertained a similar opinion as to the effect of the *cardamine* and *anemone pratensis*, *artemisia*, and the *radix pæoniæ*. *Digitalis* was employed by SHAAL; *emollients*, by KORTUM; *ipeacuanha*, by PLENK; and various *narcotics* by the majority of authors, chiefly in combination with stimulating antispasmodics, in order to ensure their effect. Of the substances now enumerated, the most deserving of notice seem to be the preparations of *zinc*, *bismuth*, *musk*, and the *mistletoe*. Of the former of these I have had much experience; but, upon the whole, they are inferior to *camphor*, *valerian*, *assa-fœtida*, *ammonia*, and the *æthers*, judiciously combined and assisted by other remedies, particularly when taken upon the first intimation of the seizure. If the disease be the result of exhaustion or inanition, and particularly if it assume a periodic form, the preparations of *cinchona*, the sulphate of *quinine*, *iron* (BUECHNER, REIDLIN, LOEFFLER, HUTCHINSON, ELLIOTSON, &c.), especially the sub-carbonate in large doses, or the ammonia-tartrate, and the *arsenical* solution with *potash*, are the most appropriate remedies, either alone, or with aperients, or antispasmodics, or anodynes and narcotics, according to the peculiarities of the case. I have, for many years, employed the *infusion of green tea*, if the convulsions arise not from inflammatory action within the head, and generally with great success. The good effects of the medicines now mentioned, when they produce any, are to be imputed chiefly to their influence in overcoming the susceptibility of the nervous system, giving tone and energy to the moving fibres, and increasing the secreting and excreting functions. In order to ensure their effects, they should be varied and changed from time to time, and differently combined with one another.

62. *e.* There is scarcely any *anodyne* or *narcotic substance*, that has not been employed in convulsions. The preparations of *opium*, of *poppy*, of *belladonna* (STOLL, BERGIUS, &c.), of *conium* (STOERCK, &c.), of *hyoscyamus*, *stramonium* (STOERCK, SIDREN, WADENBERG, &c.), and *tobacco* (RIVERIUS, CURRIE, THACKERAY, HAYGARTH, &c.), have been prescribed in various modes and states of combination—with aperients, or stimulants, or tonics, &c.—internally and externally—in enemata, and in suppositories. The most successful modes of exhibiting either of these substances, in convulsions, are *internally* with camphor, assafoetida, or the sub-carbonates of the alkalies; and *externally*, either in the form of liniment, embrocation, or plaster on the epigastrium, or along the spine, combined with the substances just mentioned, or with any of the liniments or plasters in the Pharmacopœias, or in the Appendix.

63. *f.* Various *derivatives* or *revulsants* have been used in the intervals, as well as in the paroxysm. Blisters may be employed; but they are not so generally appropriate as the production of a number of pustules by means of the tartar emetic ointment or solution (F. 749.), or of the croton oil, rubbed



upon the inside of the thighs, or on the epigastrium, or along the spine. Several writers have directed blisters to the head; but the pathological states admitting of their application in this situation are comparatively rare, and require the most intimate knowledge of disease, and appreciation of symptoms for their recognition. It is only when the vital energy of the brain is profoundly sunk or exhausted, and not suppressed by congestion, or active determination of blood, or the pressure of effused fluids, or adventitious formations, that a blister on the scalp can be of any service. When applied to the nape of the neck, or behind the ears, or between the shoulders, they are seldom of much use, unless kept open for some time. The pea or mezereon issue in the insides of the thighs, and antispasmodic liniments or plasters along the spine, or over the epigastrium, are sometimes useful auxiliaries.

64. *g. Electricity and galvanism* have been proposed in convulsions; but I agree with GRAPENGISSER in thinking them hazardous. *h. Cold bathing* has been very commonly recommended; but it requires discrimination. It will benefit chiefly those cases which are unconnected with organic lesion, and which depend upon general debility and susceptibility of the nervous system. In these the salt water bath should be preferred, and its use commenced in the tepid state, the temperature of successive baths being gradually reduced. The *cold shower bath* is more generally applicable, particularly upon getting out of bed; and when it cannot be resorted to, the patient ought to sponge or bathe the whole head with cold water every morning. The strictest attention should, at the same time, be paid to the state of the digestive functions, and of the alvine evacuations. Cutaneous excretion also ought to be promoted; for, not only are all the other functions thereby improved, but contingent disturbance of any of them, and the irregular distribution of blood, in which convulsions often originate, are less likely to take place whilst the circulation in the surfaces is uninterrupted. It is probably from this mode of operation, as much as from their antispasmodic action, that service has been obtained from several diaphoretics, particularly the *kermes mineral*, and other antimonials, recommended by UNZER, GULBRAND, STRUVE, and HARDER. *i. Warm baths, hip baths, semicupium, &c.*, when any advantage is derived from them in the intervals, act chiefly in this manner. But I believe that they will seldom be productive of much benefit, unless in cases connected with suppressed eruptions, or the exanthemata, or with irregular or difficult menstruation, and with disorders of the digestive canal in children; and in these the effects of warm baths will be much enhanced by stimulating or irritating frictions of the surface immediately upon coming out of them.

65. *k.* The almost epidemic prevalence of convulsions during states of religious enthusiasm and mental excitement, as shown by the occurrences already referred to (§ 16—18.), and by the seizures that affected many of the Jansenists who made pilgrimages to the grave of Deacon Paris, during the persecution of this sect in 1724, as well as by the convulsions at one time so uncommonly frequent in the Methodist meetings in various parts of Cornwall, as described by Mr. CORNISH,

should lead the physician to recommend such moral regimen as the circumstances of particular cases may seem to require. The above facts, as well as the circumstance recorded by BOERHAAVE, of almost all the girls and boys in the hospital of Haerlem being seized by convulsions from their seeing a girl who had been frightened into them, will alone show the importance of separating the affected from females or other susceptible persons. There can be no doubt that simple hysterical or epileptic convulsions occurring in one among a crowd of females will often occasion convulsive seizures in others, particularly in those of a delicate frame and nervous temperament, although they may have never previously been similarly disordered. I have met with such an occurrence more than once. Indeed, the number of these attacks on the public occasions referred to, is a sufficient proof both of the influence of the mind in producing them, and of the propriety of the immediate separation of a person thus seized, as was judiciously and successfully practised by Dr. HAYGARTH. The propensity to become affected by convulsions from seeing one in a fit appears to have been well known to the Romans, and from its frequency on occasions of public assembly, as much as from other considerations, they obtained the name of *Morbus Comitialis*, which has been understood as applying only to epilepsy, but which I believe had a much wider signification, and comprised all convulsive seizures. That fear or terror will not only occasion convulsions, but also remove them, or at least often prevent their accession, might be inferred *à priori*, even if it were not proved by experience. The actual cautery employed by BOERHAAVE soon put a stop to them in the hospital at Haerlem: and their prevalence in certain of the Zetland Isles was said to have been arrested by the uncereemonious ducking inflicted upon two or three of those affected; the fear of being treated in the same way having effectually prevented others from being attacked.

66. *l. Regimen.*—The circumstance of those convulsions which arise in crowded assemblies from mental excitement and religious impressions being often ushered in by faintings, and signs of congestion of the cavities of the heart, of the large vessels, of the lungs, &c., should suggest the avoidance, by susceptible persons, of warm and crowded assemblies, where the foul and moist air conspires with moral emotions in depressing the nervous power, and in favouring congestions of the heart's cavities and large vessels; as well as the propriety of removal to the open air, and of having recourse to antispasmodic stimulants upon the approach of the sinking and oppression at the epigastrium and præcordia, which often usher in the fit. The importance of administering to the mental affections and emotions—of relieving as much as possible anxiety or despondency—ought to be pointed out to those concerned, and the patient encouraged strenuously to resist the invasion of the paroxysm. Persons subject to convulsions should never receive indulgence on account of *them*, but be made to know that they may be warded off, by not yielding to the feelings which often favour or produce them. Regular hours of rest, of recreation, and of eating, should be adopted; seden-



tary habits avoided; exercise in the open air taken daily, and both the mind and body duly occupied without fatiguing either the one or the other. In some cases, depending upon disease of the brain or its membranes, the appetite is morbidly increased, and much more food is taken than is requisite to the wants of the frame. Others are connected with indulgence in spirituous liquors. It is almost unnecessary to add, that unless these excesses be guarded against, and the diet and regimen duly regulated, medical treatment will not be efficacious.

67. ii. TREATMENT OF CONVULSIONS IN INFANTS AND CHILDREN.—*A.* Many of the measures already recommended in the *paroxysm* may be also employed in this class of patients; but in a suitable form, and with strict reference to existing pathological states. Where we observe the indications of cerebral irritation and congestion (§21, 24.), *cupping* on the nape of the neck, behind the ears or occiput; the *warm bath* or *semicupium*, with *cold affusion*; cold epithems, &c., on the head, the hair having been removed or cut close; a dose of *calomel*, or of calomel and scammony if the child can swallow, and a *cathartic and antispasmodic injection*; are suitable remedies. The jugular vein may be opened in robust or well-grown children; but care should be taken not to bleed them to syncope, as a return of the convulsions may be thereby occasioned. Children ought to be bled with great caution during a fit; for although I cannot go so far as to say, with HARRIS, that it is dangerous to bleed in the *paroxysm*, yet I believe that the convulsions will occasion a hurtful quantity of blood to flow without any immediate effect, if the evacuation be pushed with the view either of subduing them, or inducing syncope. It is as improper as it is futile to lay down any rules as to the extent to which depletion may be carried. It is obvious, that when the child is plethoric, the head large and hot, the eyes suffused and prominent, the carotids throbbing, &c., it may be practised freely, even in the fit, without risk.

68. *a.* Convulsions sometimes proceed from the nature of the ingesta. If this be the case, and if the abdomen be distended, an *emetic* should be exhibited without delay. Seizures not infrequently arise during the period of dentition, from indigestible or irritating substances in the *prima via*, and in such cases often commence in simple flatulent colic. After an *emetic* has been exhibited, or even independently of it, a *purgative*, if it can be taken, should be prescribed, along with carminatives or antispasmodics, and a clyster thrown up. In cases of this description, I have found a dose of calomel, with soda or potash, or the hydrarg. cum creta, followed by either of the following mixtures, a carminative enema, and friction with an antispasmodic liniment on the abdomen or spine, the most successful means:—

No. 158. R. Magnes. Ustæ ʒss.; Sacchari Albi ʒj.; Olei Anisi M℥v.; tere bene simul, et adde Aquæ Fœniculi Dul. ʒjss.; Spirit. Ammon. Fœtid. M℥xv.; Pulv. Rhei xvj.; Syrup. Papaveris ʒij. Fiat Mist., cujus capiat coch. unum, vel duo minima, tertiis vel quartis horis.

No. 159. R. Olei Ricini ʒiij.—ʒss.; Olei Terebinth. ʒj.—ʒij.; tere cum Vitel. Ovi, et adde Aq. Fœniculi ʒss.—ʒj.; Syrup. Papaveris et Syrup. Rosæ āā ʒij. M. Fiat Mist., cujus sumat partem quartam vel tertiam, tertiis vel quartis horis.

69. *b.* *Clysters*, containing valerian, assafoetida, or a terebinthinate substance, triturated with the

yolk of egg, and any of the carminative waters, to which oleum ricini or ol. olivæ may be sometimes added, are the most appropriate to those cases. Much discrimination is required as to the choice and continuance of cold applications to the head, particularly if the warm bath or *semicupium* be simultaneously resorted to. These combined means should never be left to the discretion of a nurse, at least without the personal superintendence of the practitioner in the first instance. In general, as soon as the temperature is reduced, and the features become pale and shrunk, or the fontanelle (if unclosed) level, or at all depressed, whether the convulsions, or sopor, when present, disappear or not, the application of cold to the head, in any form, should be left off, to be again resumed when the symptoms requiring it recur.

70. *c.* During dentition, or even before the teeth approach the margin of the gums, free *scarifications* ought to be practised, and repeated as soon as the scarified parts cicatrise, otherwise the obstacle to the passage of the teeth will be thereby increased. If general or cerebral plethora be not present, or has been removed, and the bowels have been fully evacuated, any of the alkaline or earthy sub-carbonates, with aqua fœniculi, or aq. pimentæ, æther, camphor, &c., with the extract of conium or hyoscyamus, or the syrup of poppies, or small doses of laudanum, may be prescribed with the view of soothing the susceptibility and irritability of the frame at this period. Form. 347. 442. 865. have been ordered by me very generally in such cases, at the Infirmary for Children. In very young infants, convulsions may be occasioned solely by the retention and accumulation of acid and acrid sordes in the *prima via*. These are readily removed by a dose of calomel, followed by oleaginous or other purgatives, the *semicupium*, and clysters. TISSOT and SHARP state that they have been produced by the retention of the meconium owing to spasmodic stricture of the sphincter ani. This is, however, a rare occurrence. Emollients, oleaginous laxatives, the *semicupium*, clysters, and anodyne liniments, are appropriate to such cases. It has been repeatedly contended for by most of the older, although denied by many modern writers, that the anxieties, the more violent passions, and the irregularities of the nurse, may change her milk so as to disorder the digestive organs, and thereby give rise to convulsions in delicate infants. This fact is established by repeated observation. I perfectly agree with Mr. NORTH, who has taken a very judicious view of this subject, that it should never be overlooked. The obvious remedy in such cases is to change the nurse; and, if this cannot be done, to remove as far as may be the cause of disorder; to promote her digestive and excreting functions; to tranquillise or subdue any mental disturbance or febrile action that may affect the state of the milk, and to prescribe for the infant aperients with soda or ammonia, or other antacids and antispasmodics. I have often employed the oxyde of zinc or of bismuth with soda, or the pulvis cretæ compos., and either the pulvis ipecacuanhæ comp., or small doses of conium or hyoscyamus, with much advantage in these cases; or simply the sub-borate of soda in camphor mixture or aq. fœniculi.



71. *d.* The *cold bath* is a very doubtful remedy in the seizure: it is much less efficacious than the cold affusion on the head; and, when the child retains its consciousness, it even sometimes aggravates the mischief. Of the recommendation of Dr. BRONN, to employ gradually increased *pressure* on the epigastrium during the fit, I have had no experience: it, however, deserves a trial.

72. *e.* Of the use of *blisters* in convulsions, as well as of alkaline rubefacients, as the liquor ammonæ, no favourable idea should be entertained, as they require the utmost discrimination, and are far from being unattended by risk: for, although they will often cut short the paroxysm, yet they will also occasionally produce so violent irritation and inflammation as to be rapidly followed by sphacelation of the integuments. This is liable to happen particularly in ill or insufficiently fed, in delicate and irritable children; in those of a gross or fat habit of body, who have been allowed to feed upon the richer sorts of animal food too exclusively; in the state of vital exhaustion observed in the latter stages of disease, as well as in the early periods, when the pulse is very quick, irritable, or sharp, the skin dry and burning, and the cerebral organs much excited or oppressed;—under such circumstances, I have usually directed a liniment composed of equal quantities of the liniment. saponis et opii (*Ed. Phar.*), and of the liniment. terebinthinæ, or either of F. 308. 311. to be rubbed on the epigastrium and abdomen, or along the spine. THUNBERG advises the cajepout oil to be applied to the epigastric region during the fit; HERZ directs the animal oil of dippel to the same region, and ABRAHAMSON the oil of rue. Either of these will frequently cut short the paroxysm, but I can assert, from a very extensive experience, that the liniments I have recommended are the safest and most efficacious.

73. *f.* When convulsions occur in the invasion of any of the *exanthematous fevers*, or upon the retrocession of the eruption, the treatment must depend, in a great measure, on the habit and strength of body, and the extent to which the brain is affected. If cerebral congestion or irritation, with general heat of surface, exist, local depletions, the cold affusion on the head, whilst the patient is plunged in a warm bath, to which some vegetable or mineral alkali has been added, cooling aperients, cathartic injections, the tartar-emetic ointment and solution F. 749. rubbed on the spine, and diaphoretics, are generally most serviceable. After the bowels have been freely evacuated, the carbonate of soda and nitrate of potash, given in mucilaginous vehicles; the spirit. ætheris nitrici, with the liquor ammoniæ acetatis, in camphor, jalap, &c.; may be prescribed. If the skin be cool, and the pulse weak, or if the fit have occurred after the disappearance of the eruption, salt and mustard may be put in the bath; and if the countenance be pale and collapsed, and the cerebral functions not materially disturbed, warm and cordial diaphoretics, as the preparations of ammonia, camphor, serpentaria, &c., exhibited from time to time. Frictions of the surface, immediately after the patient is taken out of the bath, will generally promote its good effects.

74. *g.* If convulsions occur in the course of *hooping cough* or *croup*, we may conclude that conges-

tion, or inflammatory irritation of the membranes of the brain, has supervened, and should direct local depletions, the cold affusion on the head, semicupium, and the sub-carbonates of the fixed alkalies, with opium, hyoscyamus, or belladonna, in minute doses, unless the patient is already much reduced by repeated or large evacuations, when we may infer that the convulsive seizures are connected with anæmia, and should prescribe the treatment already described in relation to this state (§ 55.).

75. *h.* The convulsions which occur so frequently as a consequence of chronic or *severe bowel complaints*, and of exhaustion from other diseases, and which have been too frequently imputed to dropsical effusion in the ventricles, require cordial antispasmodics, tonics, and light nutritious diet. Although sometimes attended by more or less effusion, arising from the physical condition of the cranium and its contents, and serving to prevent any vacuum from being occasioned by the deficiency of blood in the cerebral vessels, yet the convulsions should not be viewed as proceeding from the effused fluid, but rather from the irregular and imperfect supply of blood to the cerebral structure.

76. *i.* The seizures that follow great *losses of blood* in children are generally characterised by too active determination of this fluid to the cerebral structure; and require the head to be kept cool and elevated, the bowels to be acted upon, and restoratives, antispasmodics, cordials, and tonics to be administered, with the extract of poppies, conium, or hyoscyamus, according to the peculiarities of the case.

77. *k.* If convulsions follow the disappearance or *repulsion* of *chronic eruptions*, we should dread the existence of inflammatory irritation of the membranes of the brain or medulla oblongata or spinalis, with a tendency to serous effusion. Local depletions, the warm bath; frictions of the surface, particularly of the part whence the eruption had disappeared, with irritating liniments; the use of sinapisms, and deobstruent purgatives, as calomel, &c.; are chiefly to be confided in.

78. *l.* When the seizures have recurred several times, particularly in infants, and are attended by dilated pupil, squinting, slow pulse, &c., their connection with *hydrocephalus* may be inferred. In such cases, even local depletions should be employed with caution: but in many instances they may still be resorted to, in small quantity; and followed by alterative doses of calomel or hyd. cum creta, diuretics, small doses of digitalis with spirit. æther. nit., and the use of the liniment (F. 311.) to the head and loins both in the fit and in the interval.

79. *B.* The *preventive treatment*, *a*, in *plethoric*, fat, and gross-living children, should chiefly consist of a proper regulation of diet, as advised by BEAUMES. Farinaceous food ought to be adopted, with only an occasional indulgence of the less stimulating meats. No rational plan of treatment, however, can be attempted with the view of prevention, without strict reference to the remote and proximate causes of the affection; the former of which should be carefully avoided, and the latter removed by suitable treatment. When we detect cerebral irritation, or determination of blood to the brain, or active congestion,



*cupping*, as already directed; the daily affusion of cold water on, and a constantly cool state of, the head; a moderate, but continued, action on all the secreting and excreting organs; tranquillity, and the abstraction of all excitement of the mind and senses; a bland and low diet; the use of revulsants, and warm clothing on the lower extremities; are the most appropriate remedies.

80. *b.* In very delicate children, where no evident inflammatory irritation within the head exists, a tonic treatment is obviously requisite. The sub-carbonate or ammonia-tartrate of iron may be given, either alone, or with other antispasmodics, or any of the other preparations of this metal. The sulphate of quinine, or the preparations of cinchona, with liq. ammoniæ acetatis, and a little of any of the compound spirits of ammonia; suitable diet, attention to the state of the bowels, and change of air, will also be of service. Calomel, in frequently repeated doses, either alone, or with purgatives or anodynes, has been most injuriously resorted to by practitioners, upon the mistaken notion that convulsions are always connected with irritation within the cranium, and that this medicine alone can remove this state; whereas, if calomel be prescribed in small and frequently repeated doses, it will actually increase the susceptibility and irritability of the body generally. When, however, it is given in full doses at distant intervals, or only occasionally, and either combined with jalap or some more active purgative, or followed by cathartics and enemata, it is a valuable remedy. Where the bowels are thus judiciously acted upon from time to time, and particularly if this be accomplished by a terebinthinated draught, tonics, combined with antispasmodics and anodynes, will be of the greatest benefit, especially if there be no disorder of the cerebral functions to forbid their exhibition. The sulphate or oxide of zinc, or the sulphate of quinine, or the oil or other preparations of valerian, or assafoetida, musk, &c., with either conium, hyoscyamus, or the extract of poppy; the tonic decoctions and infusions, with the alkalies; and various other remedies already recommended in the intervals (§ 61. 75.), may be severally employed, according to circumstances, after purgatives have been duly prescribed, and the stools have become natural.

81. *c.* When we have reason to infer that the convulsions proceed from *intestinal worms*, calomel with camphor, and the other cathartics noticed above; the occasional exhibition of an active terebinthinate draught, followed by enemata, containing aloes, assafoetida, camphor, &c., and subsequently, by the preparations of iron, as well as any other of the remedies and modes of combining them described in the article *WORMS*, may be directed. It is generally remarked by the German writers, that worms never form in the alimentary canal previously to weaning, if the milk be healthy; and the observation is confirmed by my experience. It is, therefore, after this period that convulsions can be referred to this cause.

82. *d.* The marked *hereditary* and *constitutional tendency* to convulsions in the same family of children, and the very frequent connection of this affection with cerebral irritation, or with dropsical effusion in the ventricles, or between the membranes, in such cases, have presented

difficulties to every practitioner. I believe that the disease, when occurring in this manner, has been too frequently ascribed to inflammatory action, and a too lowering treatment adopted. Mr. HILL recommends the arsenical solution, with musk, in these cases; and I doubt not their utility, if carefully employed; but other tonics and antispasmodics, particularly the weaker preparations of bark, or calumba, with the liquor potassæ, and small doses of conium, or syrup. papav., or opium, if the child be not too young, and if the watchfulness or erithism of the brain be present, will be found still more serviceable, especially if the head be kept cool, the secretions and excretions carefully promoted, and the kidneys occasionally excited by the addition of diuretics to the tonics, as the spir. æther. nit., digitalis, syrup. scillæ, &c., or by the application of a suitable liniment (F. 311.) to the loins. In several cases of this description, I have directed, after other means had failed, and while tonics, as now prescribed, were given, the hair to be cut off, and the liniment to be rubbed upon the head immediately after the cold affusion. In cases connected with inflammatory irritation of the membranes, local depletions, the cold affusion, &c. (§ 67.) should precede the above treatment.

83. *e.* The diet and regimen of children that have once experienced a seizure of convulsions, ought to be carefully attended to. The stomach ought never to be overloaded, either by the mother's milk or by its ordinary food, which should be always recently prepared, and easy of digestion. As crying often brings back the seizures in infants and young children, it should be prevented as much as possible. When the bowels have been sufficiently evacuated by the medicines suggested, from one to three grains of the *hydrargyrum cum creta*, either alone, or with the sub-carbonates of the fixed alkalies, may be given at first every night and morning, and afterwards every night, or every other or third night. The head should be always elevated; and whilst in bed or indoors it ought to have no other covering upon it than that with which Nature has provided it. On no occasion should the warm fur or beaver hats, which are very improperly worn by children, be used; nor ought the mental powers to be prematurely or inordinately excited. In a word, the head should be kept always cool, the mind tranquil, the lower limbs warm, and the bowels open. A free, temperate, and healthy atmosphere, with occasional change of air, is also as necessary as medical treatment.

84. *iii.* TREATMENT OF PUERPERAL CONVULSIONS. — The more frequent occurrence of convulsions in a first pregnancy, during a protracted labour, in those who have experienced them previously; the period of the puerperal state, and the progress of the labour and state of the os uteri when they do occur; the characters they assume — whether those of eclampsia, of epilepsy, of hysteria, or of simple clonic convulsion; the causes which induce them, the circumstances connected with them, and the fact that they, more than any of the other forms of convulsion, are the result of active determination of the blood to the head — which, however, is merely the effect of irritation primarily seated in the abdominal viscera; are



all to be taken into consideration in the treatment of them. The *intentions of cure* are the same in this as in the foregoing states of convulsion; and they should be promptly fulfilled.

85. *A. In order to cut short the seizure, — a.* After having resorted to suitable means to protect the tongue, as the introduction of a cork between the teeth, &c., blood-letting from the arm, but preferably from the jugular vein, when it can be easily performed, should be employed, and carried at once to a decided extent relatively to the vigour and habit of body of the patient; and it should be repeated after a short interval, if the convulsions recur, and there be no circumstances to forbid it. Simultaneously with the flow of blood, or immediately after it, the affusion of *cold water* or the application of a bladder of *pounded ice* on the head, and the exhibition of ten grains of *calomel*, and from five to ten grains of *camphor*, previously reduced to a powder by a few drops of spirit, with or without an equal quantity of musk, and shortly afterwards of two or three drops of *croton oil*, should never be omitted. These medicines may readily be administered, by mixing them in sweet butter, and introducing a portion from time to time over the root of the tongue, upon the end of an ivory letter folder, or upon the handle of a spoon. A *cathartic and antispasmodic enema* (F. 141. 149.) should also be thrown up without delay; and immediately repeated, if it be returned. The combined effects of these will seldom fail of producing a solution of the paroxysm. My experience of the excellent effects of *camphor* is fully confirmed by Dr. HAMILTON, although CHAUSSIER expresses an unfavourable opinion of it, and of all heating antispasmodics; and the recently published observations of Mr. MICHELL are strongly in favour of musk, which he gives in doses of from one to two scruples. Depletion may be carried further in those states of the disease which assume the characters of eclampsia, or which are attended by great fulness about the head, or stertorous breathing, than in almost any other malady. CHAUSSIER advises, after general depletion has been practised, local bleeding from the nape of the neck and occiput, or from the epigastric region.

86. *β.* As to the propriety of prescribing *opium* in puerperal convulsions, very opposite opinions have been given. PETIT, HAMILTON, MERRIMAN, and DEWEES consider it most injurious; MANNING and BLAND recommend it; and LEAKE and BURNS, with a judicious discrimination, state, that when the disease is not accompanied with fulness of the vessels of the head, it may be exhibited with advantage after blood-letting. In this decision I concur, and add, that it should always be given either with *camphor*, as directed by STOERCK, or with the sub-carbonates of the alkalies, as advised by STUTZ and BRUNINGHAUSEN, or with both; more particularly when the convulsions occur from excessive irritability, or previously to the period of full gestation, or after delivery, or when they assume chiefly the characters of hysteria. RINCK applies it to the abdomen, and HUFELAND to the soles of the feet.

87. *γ.* Some difference of opinion exists as to the propriety of exhibiting *emetics* in this disease. DENMAN is in favour of them, but MAURICEAU, CHAUSSIER, and HAMILTON condemn them, unless after blood-letting, and when the seizure has

been excited by improper ingesta, — the only circumstances under which, in my opinion, they should be given; and in which Dr. BLUNDELL also recommends them. Of the good effects of *active cathartics* there cannot be the least doubt. I have always observed, as Dr. MERRIMAN has stated, that the stools procured by them are morbid and offensive.

88. *δ.* The next practical point of importance is, whether or not the patient should be *immediately delivered*; and on this the sentiments of the most eminent accoucheurs are at apparent, rather than actual variance. No person will deny that the state of the uterus is connected with the cause of the seizure; therefore it would obviously seem requisite to remove that state. But the objecters reply, that convulsions also occur after delivery, when this state of uterus no longer exists: I have, however, never met with any, of several cases of convulsions after delivery for which I have prescribed, that did not arise from analogous causes of irritation, viz. an over-distended urinary bladder, the retention of the placenta or of coagula in the uterus, or the accumulation of fæcal or irritating matters in the bowels. I therefore would adhere to the opinion I have often given, namely, if the above means have failed, and if the labour be so far advanced as to enable the accoucheur to deliver immediately without force or injurious interference, then let it be done. If the labour be not so far advanced, but yet the *os uteri* is considerably dilated, then the membranes may be ruptured, particularly if they be very tumid, — if, indeed, they have not been already ruptured, which is often the case, — and either full doses of the *sub-borate of soda* (ʒj. to 3 ss.) given, or the *ergot of rye*. If the *os uteri* be rigid or undilated, the former of these will be preferable. If, however, the labour has not proceeded far, then any interference, excepting by the exhibition of medicinal substances, may be more injurious than beneficial. LA MOTTE, OSBORNE, LEAKE, HAMILTON, DUBOIS, ASHWELL, NAUCHE, MIGUEL, BURNS, OSIANDERS father and son, DUGES, and RAMSBOTHAM, are favourable to as early delivery as possible without violence; whilst BLAND, GARTHSHORE, BAUDELLOCQUE, HULL, GARDIEN, DENMAN, and BLUNDELL, are against forcible dilatation of the *os uteri*, and attempts at delivery in the early stage of labour. After all, the difference is more in words than in intention; for the general object is to hasten delivery, without injurious interference, if the labour be so far advanced as to render the attempt prudent; and those who have espoused either side have stated their opinions with such exceptions and limitations, and with so little precision, as to leave the subject nearly where they found it, and to render it no easy matter to ascertain under what circumstances they would either have recourse to art, or trust to nature. When the treatment already recommended fails, or is followed by an exasperation of the convulsions, — which will very seldom occur if it have been judiciously directed, — then I conceive that the active interference of art should be called to our aid. There is, perhaps, no subject on which opinions are stated to be so much at variance as on this, — each succeeding writer placing those of his predecessors in opposition, even where no real



difference exists, and thereby bewildering the inexperienced, in order that he may have the credit of giving a decision respecting it.

89. *ε*. CHAUSSIER recommends, in rigidity of the uterine orifice, the application of a pomade containing *belladonna*, with the view of relaxing the spastic contraction, which, he states, is not limited to this part, but extends to the whole of the organ. I believe, however, that the body of the womb is generally free from spasmodic contraction. This preparation consists of two drachms of the extract of this narcotic, softened with an equal quantity of water, and triturated with about an ounce of prepared lard. A piece, the size of a small nut, is to be introduced into a female syringe, open at the extremity, and conveyed to the os uteri, where it is to be applied by pushing onwards the piston. In about half an hour the rigidity subsides, and the labour proceeds. Of this practice I have no experience. M. CHAUSSIER discourages any other attempt at dilatation of the os uteri, as irritating the parts, and inducing a recurrence of the convulsions.

90. *ζ*. I have never omitted, in any case treated by me since 1819, to employ the affusion of a stream of cold water on the head, and the injection of turpentine clysters, sometimes with camphor, assafoetida, or valerian, and the results have been most satisfactory,—a much less quantity of blood having been detracted than is usually required in such cases. I am not aware that either of these two remedies had ever been employed in puerperal convulsions, until long after I had given publicity to the practice,—a practice which I know to have been recommended very recently by those, who, at that time, ridiculed it. In the more rare states of the disease, which are attended by a weak quick pulse, pale features, and hysterical symptoms, enemata containing valerian, assafoetida, or camphor, are very serviceable. In those which assume the comatose or apoplectic characters, *blisters* applied to the nape of the neck, and *sinapisms* to the ankles and calves of the legs, are useful adjuvants of the measures already recommended.

91. *η*. In all cases occurring previously to, during or after parturition, the state of the bladder, and of the bowels, ought to be carefully enquired into. Early in 1823, I was called to the Queen's Lying-in Hospital, by the house pupil, to a patient who had been seized with puerperal fever on the second day after delivery, but was convalescent from it, when she was attacked by convulsions, brought on by a distended urinary bladder. I found that the urine had been drawn off, and that she had been blooded once largely. The case was one of extreme severity and danger; the convulsions were unremitting, and attended by profound coma and asphyxy. The vein was re-opened, and, while the blood flowed, a stream of cold water was kept playing upon the vertex, and, at the same time, a clyster with turpentine and camphor was thrown up. Thus, the three most powerful—the almost only, remedies to be confided in, were simultaneously in operation. The patient rapidly recovered. Purgatives were given by the mouth, upon the solution of the convulsions; deglutition having been entirely abolished during the whole seizure. This was one of the earliest cases in which I had ventured upon the *simultaneous*

employment of these powerful agents, the use of them in succession having been generally adopted by me previously. I allude more particularly to this case, because of its uncommon severity; of its occurrence soon after a most dangerous disease, as late as nine days after delivery, in a public institution, and at a time when my public recommendation of the practice apparently received but little attention; although it will not now be looked on with scepticism.

92. *θ*. Of *other remedies* but little may be said, as they should be viewed as auxiliaries merely. I have already expressed myself favourably of *camphor* (§85.). BURNS condemns it; but, when exhibited after depletion, and at the same time with the cold affusion on the head, and cathartic and antispasmodic clysters, it is a valuable medicine. Under the same circumstances, musk, assafoetida, and the other antispasmodics, will also be of use; for all risk of their injurious action on the brain is prevented by the cold affusion, whilst they co-operate with the terebinthinate injections to excite the contractions of the body of the uterus, and remove spastic constriction of its neck. Of the *ergot of rye*, my experience is limited. I have given it only in one case of this disease, and then it was combined with *borax*,—a medicine undeservedly fallen into disrepute—but which I have prescribed for many years. The labour in that case proceeded rapidly, and the patient recovered. Much difference of opinion exists as to the effects of, and propriety of giving, the ergot in convulsions. If the os uteri be dilated, and the external parts free from rigidity, blood-letting, the cold affusion, and cathartic injections, having been actively but unsuccessfully employed, there can be no doubt of the propriety of exhibiting it. Opinions will always be at variance as to the benefits derived from substances recently introduced into practice; for, as all medicines are remedies only from their appropriate use, experience of their operation is required to ascertain the circumstances in which they are truly of service. In a case of puerperal convulsions—I believe the first in which the ergot was exhibited—Dr. BRINCKLE gave it after the means usually adopted had failed. Twenty minutes after the first dose had been taken, uterine action came on, and the patient recovered. It is strongly recommended by Dr. WATERHOUSE, of Philadelphia, and by Mr. MICHELL.

93. *ι*. In cases of unyielding rigidity or callosity of the os uteri, VAN SWIETEN advised an *incision* to be made through its margin. DUBOSC, and, subsequently, LAUVERJAT, BODIN and COUTOUPLY, who considered it perfectly justifiable after blood-letting, the warm bath, and other means usually employed, had failed, have had recourse to this operation. M. COUTOUPLY has recorded four cases (two of which are quoted by M. MIGUEL), in which it was resorted to; three of these recovered. The death of the fourth he imputed to the circumstance of it having been too long delayed. M. NAUCHE also favours this operation in the above circumstances, especially if emollient and narcotic injections into the vagina have failed to relax the rigidity.

94. *κ*. The *warm bath*, and emollient *fomentations*, followed by the use of an anodyne liniment on the abdomen, have been recommended by DENMAN and NAUCHE; and the *tepid bath* by



CAPURON, after bleeding has been practised. Much advantage will accrue from assiduous frictions of the abdomen, more particularly if they be performed with an anodyne and antispasmodic liniment (§ 53, 54.), independently of the use of a warm or tepid bath; for either of these can seldom be used with advantage in the circumstances of puerperal patients. In every case the hair should be cut closely off. This may be done in a very few minutes; but shaving the head is merely a loss of time. BURNS, RYAN, and CLARKE advise the application of a blister on the head; but I believe that it will be required only in extreme cases; it certainly ought to be ventured upon only in such, where the coma is profound, and the pulse weak, and the patient sinking. The advantages stated to have been derived by Dr. CLARKE from *acid cathartics*, and clysters, are confirmed by my own experience. If the convulsions occur immediately after delivery, the placenta should be removed, and the existence of internal hæmorrhage enquired after—if at a later period, the state of the urinary bladder and bowels, as well as of the womb, demands attention. In all such cases, active purgatives and cathartic clysters are especially required, but the choice of them should be made with due reference to the state of constitutional power, and to the presence or absence of cerebral congestion, or of exhaustion and nervous susceptibility.

95. λ. When the convulsions attack *epileptic* females, they generally have all the characters of epilepsy or eclampsia, generally with unremitting sopor and stertorous breathing passing almost into asphyxy; and they require the treatment described above. When they occur in *hysterical* females, they may also assume the same forms, and demand the same method of cure; or they may present the features of simple hysteria, particularly borborygmi, quick pulse, &c., with very slight cerebral affection. In these latter cases, the nerve remedies mentioned in the next paragraph will be adopted with advantage, especially after the cold affusion on the head. Cold enemata may be also thrown up, as advised in HYSTERIA. In the majority of these seizures, neither bleeding nor artificial delivery is required, unless cerebral congestion supervene, or the patient be strong or plethoric.

96. μ. Convulsions in the puerperal states may occur from *great exhaustion*, from want and inanition, and *losses of blood*. In these, the practitioner should trust chiefly to the cold affusion, performed only momentarily; to the keeping of the head cool and elevated; to sinapisms on the lower extremities; to the exhibition of camphor, ammonia, the vegetable alkalies, and musk, with small doses of opium, or of the æthers with hyoscyamus or conium; to the administration of valerian, assafoetida, or turpentine clysters; to the warm bath; to anodyne frictions of the abdomen; and to as early delivery as may be safely attempted; the vital energies being supported by gentle cordials during the remissions. If the seizure be complicated with hæmorrhage from the uterus, or hæmatemesis, prompt artificial delivery, the turpentine clyster in the first instance, and turpentine draught in the second, are the most certain means.

97. B. The prevention of puerperal convulsions is of great importance. The means calculated to attain this object can be put in practice

only when the premonitory symptoms (§ 28.) manifest themselves.—a. If these indicate fullness of the vessels of the head, *bleeding* from the arm, or cupping on the nape of the neck, will be necessary; and in every instance the bowels are to be freely evacuated. There are few cases of the disease, at whatever period it may occur, entirely unconnected with fecal accumulations; and although this state of the bowels may not excite the attack, it certainly remarkably disposes to it. *Cathartics* should therefore be given by the mouth, and their action promoted by clysters. Dr. BLUNDELL advises an ipecacuanha *emetic* to be taken in the first instance; and, where there is a loaded or disordered stomach, this practice may be adopted. In addition to these, the *warm bath* may be used; and if, notwithstanding, signs of active determination continue, the *cold affusion on the head*, or cold applications, should be also resorted to, either previously, at the same time with, or subsequently to, the warm bath. Dr. HOME and Dr. BLUNDELL favour the exhibition of *digitalis* in such circumstances.

98. b. If the premonitory symptoms be characterised by leipothymia or *sinking*, rapid weak pulse, particularly of the carotids; coolness of head, sunk features, &c.,—the internal use of camphor, or musk, ammonia, assafoetida, the æthers, the warm bath, with small doses of opium, purgatives, sinapisms, blisters, and the turpentine fomentation applied on the abdomen, are the most approved means of prevention.

99. c. If the patient have had two or three attacks at some former period, and if the above preventive treatment have not rendered the accession of the disease less probable, Dr. BLUNDELL advises the membranes to be punctured.

100. C. During *convalescence*, the states of the urinary bladder and of the bowels should be carefully watched, and evacuated; the diet regulated; and both body and mind kept tranquil. If cerebral symptoms continue for some time afterwards, the head should be preserved cool, and sponged with cold water night and morning, and a blister applied to the nape of the neck, and kept open for some time, whilst a course of eccoprotic and deobstruent purgatives is continued for several days.

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CORPULENCY. See OBESITY.

COUGH. — SYN. Βήξ, Gr. Tussis, Lat. Bex, Good. Pneusis Tussis, Young. Der Husten, Germ. Toux, Fr. Tossa, Ital.

CLASSIF. — 2. Class, Diseases of the Respiratory Function; 2. Order, Affecting the Lungs (Good). II. CLASS, III. ORDER (Author).

1. DEFIN. Violent and sonorous expulsion of air from the lungs, preceded, rapidly followed by, or alternating with, quick inspiration.

2. I. PATHOLOGY. — Dr. CULLEN and several other nosologists have considered cough as chiefly a symptom, which undoubtedly it is most frequently; but I agree with Dr. YOUNG and Dr. M. GOOD in believing that it is entitled to be viewed, on some occasions, as an idiopathic affection. Dr. GOOD, however, has ranked it as a genus, and comprised under it various affections, which are either merely slight forms of BRONCHITIS, or the results of organic changes in the LUNGS, and which I have treated of in these articles, and in those on BRONCHORRHEA, CATARRH, and INFLUENZA. He has, moreover, subdivided it into more varieties than can easily be recognised in practice, and has viewed HOOPING-COUGH as a species of the genus, instead of a distinct disease.

3. CAUSES. — Cough, in either of the forms about to be particularised, commonly attends disorders of the air-passages, and of parts in their vicinity, particularly of the larynx; also those of the lungs, and their membranous coverings; and sometimes diseases of other organs by which the respiratory functions are affected sympathetically — or rather, from continuity of tissue or nervous communication. It is thus occasioned by affections about the fauces, tonsils, pharynx, and neck; by the irritation of dentition; by diseases of the oesophagus, particularly when inflammation and ulceration of this part extends to, or penetrates, the membranous part of the trachea (KAPPELHOUT, Mr. BYAM, and myself); diseases of the spine and its contents (WICHMANN); by cretaceous or calcareous formations in the ramifications of the bronchi (MORGAGNI, BONET, BAILLIE, PORTAL, and myself in several cases, two of which occurred in gouty subjects); by all organic changes of the thoracic viscera; by the accidental passage of foreign substances, solid or fluid, into the air-passages; by the lodgment of the eggs or larvæ of insects in the same situation (VOGEL and PERCIVAL, &c.); by the irritability of parts attendant upon the nervous temperament and debility; by the influence of irritation and imagination, — a cause which did not escape the observation of the acute MONTAIGNE; irregular or misplaced gout; the irritability of the parts continuing some time after measles, or inflammations of the air-passages or lungs; disorders of the digestive organs, particularly the stomach and liver, &c. (WINTHER, STEIN, PERCIVAL, &c.); by accumulations of bile in its receptacle; by the irritation of worms; by the repulsion of cutaneous eruptions, and the healing of old sores, and suppression of chronic or accustomed discharges. From this enumeration it is evident that cough is chiefly a symptom of numerous pathological states, which will be found very fully described under different heads, as indicated above. The epidemic cough noticed by some writers falls under the article INFLUENZA. In the act of coughing, the



lungs are passive; and in the *idiopathic* states of the disorder they are not organically affected; the disorder being chiefly seated in the *trachea*, *larynx*, and vicinity. In very many cases, the irritation occasioning the cough exists chiefly in the posterior *fauces* and *pharynx*, and extends no further than the epiglottis and *rima glottidis*.

4. i. A. DRY COUGH occasionally occurs in an *idiopathic form*,—*a.* From exposure to cold in any form; the attendant symptoms not amounting to complete CATARRH; and it may, or may not, in a very short time terminate with slight mucous expectoration. When, however, it arises from this cause, it usually runs the course described in that article. *b.* It is occasionally produced by acrid or acid fumes and gases, or by various foreign substances inhaled, or accidentally passed, into the trachea, and from several of the other causes enumerated above (§ 3.). *c.* It also, in some cases,—first noticed by MONTAIGNE, and well described by WHYTT,—presents a strictly *nervous* character, particularly in nervous, hysterical, and irritable persons. *d.* In those especially, and also in feeble or delicate constitutions, a short, frequent, and dry cough is sometimes met with, without any disease of the lungs, air-passages, or other organs; and the only change that can be detected is slight redness at the margin of the soft palate, or in the posterior *fauces*; sometimes only in the *pharynx*; and occasionally near the *tonsils*; but this is not uniformly, although frequently, observed. Here it is obvious that the irritation of these parts extends to the glottis, or to the epiglottis only; and that it is either strictly local, or connected with slight derangement of the stomach and *prima via*. In the former case it is *idiopathic*, in the latter symptomatic, or at least a complicated ailment.

5. B. Dry cough is more frequently *symptomatic*—*a.* Of the first stage of diseases of the larynx, trachea, and lungs; of organic changes of the large blood-vessels of the chest; and sometimes of complaints of the more superior of the abdominal viscera. *b.* It is frequently occasioned by *elongation* of the *uvula*, and the irritation this part produces about the root of the tongue and epiglottis. But when the *uvula* is elongated, there usually is also more or less co-existing irritation about the posterior *fauces* and *pharynx*, extending to the glottis or epiglottis. And it should be, moreover, kept in view, that these ailments are principally dependent upon, even although they may not be always produced by, disorder of the stomach and digestive organs generally. *c.* In many instances, also, it will be found that the cough is owing to irritation of the *mucous surface* of the *stomach* and *œsophagus*, although it may not extend so far as to be apparent in the *pharynx*, or be so severe as to occasion redness of this part. *d.* Cough is often produced by *diseases of the liver*, and by collections of bile in the *gall-bladder* and hepatic ducts. In many of such cases, the cough is severe and spasmodic, often very obstinate and of long duration; the symptoms of hepatic disorder being sometimes so slight as to escape detection, unless the attention of the practitioner is awakened to the connection; the chief indications of its existence being the loaded or furred tongue, pains about the diaphragm, fulness at the epigastrium, and indigestion. *e.* Lastly, dry cough is often

occasioned, in young and delicate patients, by the irritation of *worms* in the *prima via*. The more particular consideration of these associations will be found in the articles on the diseases of which the cough is merely a symptom.

6. ii. HUMID COUGH,—*a.* may follow upon the preceding; or it may occur primarily from the usual causes of catarrh. In such cases, it is merely a slight form of that affection, the matter expectorated being mucous or serous, and the cough unattended by manifest febrile or constitutional disturbance. This form of cough is very liable to recur, or become chronic, in delicate persons, during the winter (*winter-cough*); or from vicissitudes of season and weather; and, like the former variety, the irritation exciting it may be chiefly seated in the *pharynx* and vicinity, or in the *larynx* and trachea. In many cases the serous, or sero-mucous secretion, following the cough, entirely proceeds from the *fauces* and vicinity. *b.* In old persons, however, it is secreted chiefly by the bronchial surface, and is then, particularly in its more severe forms, the affection described under the name of *Bronchorrhœa*. *c.* Humid cough is generally less frequent, but more prolonged, and recurs in severe paroxysms. It is sometimes complicated with rheumatism and gout. It also presents the same pathological relations as described in connection with the dry variety; but it is not so often symptomatic of diseases of the abdominal viscera, as the foregoing. *d.* In the old and weak, humid cough is usually very severe, owing chiefly to the want of vital power of the respiratory organs, and of the system generally, to throw off the mucus secreted in the air-passages; and which is either very abundant, from the relaxation of the extreme vessels; or very tenacious, from absorption of its more fluid parts during its retention on the surface that secreted it, or from both conjoined. In such cases, the paroxysms of coughing are very severe and prolonged; and the affection is liable to be exasperated upon every change of season and weather. *e.* In other cases of humid cough, the exacerbations are also very severe, particularly in the morning; but the excretion is thin and frothy. This is observed most frequently in persons addicted to intoxicating beverages; and in those debilitated by sexual indulgences. When humid cough depends upon hepatic disease, it often assumes this form.

7. II. TREATMENT.—i. A. The *idiopathic states* of dry cough require demulcents, emollients, with diaphoretics and narcotics or anodynes (see F. 238. 244. 389. 426., and R 98. and 99. at p. 297.). The conium, hyoscyamus, solanum, œnanthe, and phellandrium aquaticum (THEUSSINK and FRANK), may severally be employed, and the functions of the abdominal viscera improved by suitable means. But the pathological states, as well as their causes, on which this form of cough depends, should be investigated, and the treatment modified accordingly. *a.* If it follow the impression of *cold* in any form, the treatment described in the article CATARRH (§ 15.) will be appropriate. *b.* If it be produced by the inhalation of *irritating fumes*, or the molecules of either mineral, vegetable, or animal matters floating in the air, the removal of the cause, and the use of demulcents, emollients, and emetics, and subsequently narcotics, are most to be depended



upon. *c.* When it assumes a *nervous* character, particularly in hysterical and delicate females, the state of the uterine functions, and the existence of irritation in some part of the digestive tube, or in the sexual organs, or spinal chord, should be enquired after, and the treatment directed according to the information acquired. In many such cases, the exhibition of a gentle purgative, and afterwards small doses of camphor, ipecacuanha, ammonia, oxydes of zinc and bismuth, hyoscyamus, extract of hop or poppy, the sub-carbonate of soda, &c. variously combined, will be of service. If there be evident debility, and the cough assumes a periodic form, the preparations of bark or of iron, the sulphate of quinine, or gentle tonics, with anodynes and narcotics, will be required. The cold bath, which has been much recommended by WHITT, will also prove beneficial. *d.* When it proceeds from irritation of the *fauces* or *pharynx*, demulcents, emollients, &c. with ipecacuanha, or with diaphoretics and anodynes, will be required. But the greatest advantage will be derived from the use of cooling and astringent gargles, and stomachic purgatives (F. 266.).

8. *B. The symptomatic occurrence of cough must be treated as pointed out in the articles on the primary affections occasioning it.*—*a.* If it be referred to the respiratory organs, the means appropriate to their diseases must not be departed from. *b.* When we observe elongation of the uvula, either with or without signs of irritation of the pharynx, disorder of the digestive functions may be inferred; and, after having had recourse to purgatives, cooling and astringent gargles, prussic acid, and mild stomachics will be useful. *c.* The dependence of cough upon diseases of the *biliary organs*, whilst it suggests a treatment chiefly directed to these diseases, will also indicate the propriety of ascertaining, with as much precision as possible, their nature. If indications of accumulated bile in the gall-bladder and hepatic ducts are detected, calomel or blue pill, with, or followed by, purgatives, and a course of alteratives, taraxacum, &c. will be requisite. In some cases, a gentle dose of either of these chologogues will produce copious discharges of morbid bile, and the immediate disappearance of a constant, severe, dry, and harsh cough, of which alone the patient has complained. In others, repeated and large doses will be required to accomplish this object. In all these, purgatives should be exhibited until the tongue becomes clean. If tenderness or pain exist in the region of the liver, with febrile symptoms towards evening, or restlessness through the night, blood-letting, general or local, ought to precede other measures; and the hepatic disease should be treated with reference to the form it presents, and as described in the article on *Diseases of the LIVER*. *d.* When the cough is attended by a tumid abdomen, and other signs of *worms*, the treatment recommended in such cases, according to their numerous modifications, must be employed.

9. In almost all the idiopathic and symptomatic forms of dry cough, more advantage will be obtained from demulcents, than from heating or stimulating expectorants, which should always be laid aside when there is evident vascular excitement of a sthenic or tonic kind. Those expectorants, however, which are of a mild nature,

or which act chiefly by exciting slight nausea, will generally be of service, particularly when combined with emollients, diaphoretics, and narcotics; and there are few conditions, in which the preparations of antimony or ipecacuanha, with liquor ammoniæ acetatis, and the warm bath, will not be extremely beneficial. In this variety of cough, also, appropriate medicines, exhibited in such a manner as will favour a prolonged impression on the palate and pharynx—as in the form of *lozenge* or *linctus*—will thereby have their effects manifestly promoted; and advantage will also accrue from wearing warm, antispasmodic, or rubefacient plasters between the shoulders, both in this and the humid variety of the affection.

No. 160. R. Confect. Ros. Canin. et Confect. Ros. Gal. aa ʒj.; Olei Amygdal. Dulc. ʒvj.; Syrup. Papaveris Albi ʒss.; Spirit. Æther. Nit. ʒij.; Acidi Sulphur. dil. ʒjss.; Pulv. Ipecacuanhæ gr. ij. M. Fiat Linctus, de quo sumatur pauxillum subindè.

No. 161. R. Emplast. Picis Comp. part. ij.; Emplast. Ammoniaci (vel Emp. Ammon. cum Hydrarg.) et Emplast. Opii aa part. i. M. Fiat Emplastrum perlargum inter scapulas impositurum.

10. *ii. Humid cough*, when it presents the characters of slight *catarrh*, requires the treatment described in that article. *a.* If it frequently recur, or become *chronic*, or assume the form of winter cough, the more tonic demulcents, as the decoction of Iceland moss, or of the sea moss, with lemon and candy,—the *mistura ferri compos.* with a decoction of liquorice root,—attention to the digestive and excreting functions,—warm clothing,—and careful avoidance of exposures to the vicissitudes of season or weather,—are most to be depended upon. *b.* When the cough occurs in old persons, with increased secretion obviously from the bronchi, gentle tonics, and expectorants, as myrrh, galbanum, assafoetida, benzoin, the oxide or sulphate of zinc, the terbinthinates, camphor, ammonia, the balsams, and, indeed, the whole of the treatment described in the articles on *Chronic BRONCHITIS* (§ 91.) and *BRONCHORRHEA* are most appropriate. *c.* When it is complicated with *gout* or *rheumatism*, purgatives, combined with tonics or stimulants, in order to carry off collections of morbid bile, and other vitiated secretions; and afterwards the medicines now enumerated, or the preparations of ammonia or camphor, combined with colchicum will generally afford marked relief. The dependence of this variety upon the diseases already noticed as occasioning the other form of cough, requires the several measures pointed out with reference to each of them (§ 8.). *d.* If the cough be very severe, in *old and exhausted persons*, and in those who have injured their constitutions by venereal indulgences, a tonic and stimulant treatment, and the remedies instanced in this paragraph in increased doses, will be requisite. It will be found in these, as well as in *broken-down drunkards*, that the cough will be aggravated by remedies which in any way depress the vital energies. In these last, the cough is frequently connected with hepatic disease, the treatment of which will depend upon its nature; but, although depletion may be occasionally required for the primary malady, the powers of life must be at the same time supported.

11. In this variety, generally, the mild expectorants, with demulcents; the jelly of sub-acid fruits; the inhalation of emollient, stimulating, or astringent vapours (see *BRONCHITIS*, § 76. 98.);



the use of acid beverages; warm, rubefacient, stimulant, and tonic plasters; the warm bath, made gently stimulating by salt and mustard; a light, demulcent, and nutritious diet, with strict attention to the functions of the stomach and bowels; change of climate, or of air, and a judicious choice of residence according to season, with gentle but regular exercise, and warm clothing; are severally of advantage, and some of them of the utmost importance. (See BRONCHI, § 104.)

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COW-POX. See VACCINATION.

CRAMP. See CONVULSIONS (§ 4.), SPASM, and TETANUS.

CRANIUM. — SYN. *Κρανίον* (from *κρανος*, a helmet, as defending the brain from injury). *Die Hirnschale*, Ger. *Le Crâne*, Fr. *Cranio*, Ital. *The Skull*.

CLASSIF. PATHOLOGY. — *Special Pathology* — *Morbid Anatomy*.

1. The cranium and its envelopes, the scalp and the pericranium, are often the seat of diseases which are of much moment, not only as respects these parts themselves, but also as regards the important organs and membranes which they contain.

2. I. DISEASED APPEARANCES OF THE ENVELOPES OF THE CRANIUM. — These are principally the same as are observed in analogous structures in other parts of the body. Nearly the same changes are remarked in the scalp, and subjacent cellular tissue, as in the integumental coverings of other parts; and in the pericranium, as in other parts of the periosteum. These structures, forming the envelopes of the cranium, will, therefore, require but little remark.

3. A. The scalp is subject to the same inflammatory states as other parts of the body; and these require the attention of the physician, from their occasional extension to the bones of the cranium and membranes of the brain. Inflammations of the scalp vary in character with the condition of the vital energies and digestive and biliary organs. Sometimes this structure is the seat of active phlegmonous inflammation, but more generally of the erysipelatous. When erysipelas attacks the scalp, a copious exudation of a serous or sero-albuminous fluid takes place in its subjacent cellular tissue. Occasionally this tissue is affected by inflammatory action of an unhealthy kind, but limited in extent, and closely resembling carbuncle, and of which I have met with some cases in children. The scalp is also par-

ticularly liable to certain specific inflammations of a chronic kind, especially to pityriasis, porrigo, sycosis, lepra, psoriasis, eczema, rupia, and syphilitic ulceration. Tumours, generally encysted, sometimes form beneath the scalp, most frequently between it and the tendinous expansions of the occipito-frontalis, and other muscles attached to the pericranium. These expansions, and the muscular structure attached to them, are often the seat of rheumatism and rheumatic inflammation. They are not infrequently, also, affected by common inflammation and its consequences, particularly after external injuries, Dropsy of the cellular tissue beneath the scalp, independently of inflammation, is very rare. It has, however, been observed in young subjects, and received the appellation of *hydrocephalus externus*, and *œdema capitis*.

4. B. The PERICRANIUM is subject to the same changes as the periosteum in other parts of the body; amongst these are chronic and specific inflammations, giving rise to thickening of the membrane; to nodes, frequently terminating in suppuration and exfoliation of the subjacent part of the bone; and, in cases still more chronic and slight, to unnatural deposits of bone upon the external surface of the skull. (See PERIOSTEUM — *Inflammation of*.) Inflammations of an acute or sub-acute character sometimes, also, attack this structure, and, when not arrested in their progress, give rise to its separation from the bone; and not infrequently, owing to the extension of the morbid action through the tables of the cranial bones, to a corresponding separation of the dura mater from the diseased part of the skull. It seems probable that morbid action of any kind is seldom continued long in the pericranium, without the dura mater, which performs the office of an internal periosteum, suffering in a corresponding degree, and ultimately transmitting the disease to the subjacent membranes, and even to the brain itself. Specific inflammation also of this structure, of a most painful and dangerous kind, occasioning death of the portions of bone beneath the parts chiefly affected, is produced by syphilis and the inordinate and prolonged use of mercury.

5. II. MORBID CHANGES IN THE CRANIUM. — The bones of the cranium are subject to various diseased appearances, many of them having a close reference to the state of the system, and its morbid dispositions, and still more so to those slowly formed lesions which frequently affect the brain and its membranes. — A. *Enlargement*, or rather *distension*, of the bones of the cranium, is frequently an attendant upon chronic hydrocephalus, and the hypertrophy of the brain sometimes accompanying rickets. When the accumulation of fluid is great, and has taken place before ossification is far advanced, this process frequently commences at several more distinct points than in the healthy state, thus generating as many distinct bones. In the majority of these cases, although the surface of the cranial bones is greatly extended, there is a general deficiency of the ossific deposit, rendering the skull more than usually thin. The Museum of Guy's Hospital contains the cranium of an hydrocephalic man, who lived to the age of 29 years. Its circumference is  $33\frac{1}{2}$  inches. There is also in the



Museum of St. Thomas's, the skull of a child of two years, that measures 29 inches.

6. *B. Deficient deposit of bone*, as now remarked, is often connected with the foregoing lesion; in which case it is commonly general, the whole cranium being more or less thin as well as enlarged: but the thinness may also, although less frequently, accompany a natural-sized skull. The deficient deposit, or thinness of bone, may also be partial. In this case, partial or circumscribed accumulations of serum, or tumours, generally exist beneath the part of the cranium thus changed; and we have reason to believe that it is to the pressure exerted by these that the unusual thinness is to be imputed. It should, however, be kept in recollection that the cranial bones vary exceedingly in thickness, without having seemingly diverged from the healthy state.

7. *C. Imperfect ossification* is chiefly a lesion of early age, being merely a slow or impeded developement of the bones, arising from one or both of the following causes:—*a.* From deficient powers of the constitution, in which the process of ossification either generally or locally in respect of the cranium participates; *b.* From the distension arising from the accumulation of fluid. The imperfect ossification in such cases may continue to the age of three, four, or five years, and generally consists merely of a more than usual openness of the sutures, or a deficient deposit of bone at the parts most remote from the centres from which the ossific process proceeds. In some cases, however, the imperfection exists in about the middle of one of the bones; a patch of membrane, or a narrow stripe being surrounded by bone. When these patches or clefts in the bone are considerable, or remain for any time unfilled up, a portion of the membranes often protrude, forming large watery tumours, owing to the pressure of fluid effused between or underneath the membranes,—a circumstance which occasionally obtains. An interesting case of this description, successfully treated by ligature, has been recorded by Mr. E. THOMPSON. The majority of these cases are congenital, but the protrusion is often not noticed until long subsequent to birth. Sometimes a portion of the brain itself protrudes, forming a congenital hernia cerebri.

8. *D.* The bones of the cranium may be *insufficiently evolved*. In this case they are generally formed with more than sufficient rapidity, and their sutures are closed prematurely, so that they cannot give way before the growing brain, which thus becomes, with the case enclosing it, imperfectly evolved. The cranium may thus appear *unnaturally small*, as is sometimes observed in idiots and epileptics; but this state may arise not only from early closing of the sutures, but also from imperfect developement of the brain itself. *Microcephalia* was considered by HIPPOCRATES as a cause of idiocy; and facts, showing that great diminution of the size of the head is very generally connected with weakness or privation of intellect, have been adduced by GREYING, GALL, SPURZHEIM, GEORGET, and many others not believers in the doctrine of GALL.

9. *E.* The *shape* of the cranium is often somewhat changed by these and other causes. When the cranium is much *deformed*, it is more commonly a congenital vice arising either from the

pressure in utero of a deformed pelvis, pelvic tumours, &c.; or from deficient developement, early disease of the embryo, and monstrosity; or from congenital change of the structures which it contains. But deformity of the cranium may also take place after birth, from deficient or irregular developement of the brain, or from the effusion of fluids in the cranial cavity. The early closing, also, of some sutures, and the protracted closing of others, whereby the yielding of the bones is prevented in one part, and facilitated in others, are often productive of deformity. Rickets, dropsy of the brain, softening of some of the bones, particularly of the base, whereby it is thrust up into the cavity (Orrto), cretinism, &c., are all often productive of deformity. A species of deformity has several times come before me, and generally attended by epilepsy, and idiocy, which I have seldom seen noticed. This consists of *obliquity* in the halves of the cranium; one half being much more depressed, both at the top and base of the skull, than the other. This deformity is sometimes thus simple, consisting only of comparative elevation and depression of the sides of the cranium. But I have observed it more commonly connected with an equal obliquity posteriorly and anteriorly; the elevated or depressed half, either receding or advancing much more than the other. In cases of this description, the cranium has also presented a certain angular form, so that I have been led to denominate the appearance, the *diamond-shaped obliquity* or deformity of the skull.

10. *F. Hypertrophy, thickening, or enlargement of the bones*, assumes two principal forms. 1st, That of a *superabundant deposit* of the ossific matter, giving rise to uncommon density, and to the disappearance of the diploe, and converting both tables of the skull into one dense bone, resembling, but much harder than, ivory. This appearance of the cranial bones is almost natural to the negro. It is observed, also, in persons advanced in life, who have been subjected to laborious employments, physical and mental; and it is often seen in epileptics, in maniacal epileptics, and in some who have been long insane. It may or may not be accompanied with increased *thickness* of the bone. GREYING found the skull too thick in 151 out of 196 insane persons; and GEORGET observed it one twentieth and upwards too thick in 480 out of 500, belonging to the same class of patients. The second form of enlargement is rather the result of a loose or spongy formation of the bones, in which, although most remarkable in the diploe, both tables of the bone often participate more or less. In this form, the actual quantity of bony matter is not much augmented. Increased thickness of the bone generally obtains here, and sometimes reaches an enormous extent, and closely resembles in appearance a piece of pumice stone.

11. *G. Irregular deposits of ossific matter* are very frequently observed on both the internal and external surfaces of the cranial bones, particularly the former. They are often found adjoining the sutures, sometimes with a mammilated appearance on the external surface. On the internal surface, they frequently assume an irregular botryoidal form; sometimes they present large masses, particularly on the frontal bone, and encroach considerably upon the cavity. Not



infrequently these deposits are prolonged into the form of irregular processes: occasionally the prolongation is in the seat of particular parts or processes, as in the clinoid process. These exostoses are sometimes very prominent and acute. In some instances they encroach upon the foramina through which the nerves and vessels pass. In these cases, symptoms of pressure or of irritation are present, and vary according to the seat, form, and extent of the ossific deposit. Epilepsy, insanity, irregular convulsions, spasmodic contractions, and neuralgia, are amongst the most prominent effects of these productions.

12. *H. Vascular engorgement* is sometimes observed in the cancellated structure forming the diploe, in cases where great congestion, or very active inflammation, has existed in the head, membranes, or pericranium; the vessels passing from or into the bone being congested, and the diploe of a deep or purplish red colour.

13. *I. A softened state of the diploe* is not infrequently observed in cases where active inflammation has affected the pericranium, or dura mater, and extended to the bone. In these cases the tables of the bone are more friable than natural. A similar appearance is also observed when the system has been much contaminated by carcinomatous disease.

14. *K. Ulceration* of the cranial bones is also not uncommon; and is generally attended with more or less absorption, exfoliation, and the deposit of irregular bony spiculæ. Ulceration and absorption result very frequently from lupus, and the formation of bony spiculæ generally attends upon osteosarcoma.

15. *L. Caries, or death, of the bone* is not infrequently observed to follow upon inflammation extending from the pericranium, or dura mater, to the bony structure. It is a very common consequence of inflammation of the ear long neglected, or imperfectly treated. It may be limited to either of the plates, or it may extend to the whole thickness of the bone. In either case, the dead part is detached from the living by the absorption which takes place around it, and in the surrounding inflamed and ulcerated parts. Owing to this process, a distinct line of separation is frequently formed, and the dead portion is completely exfoliated. While the dead bone is being removed in this manner, or after its removal, if the dura mater, which acts as the periosteum of the internal table, is not destroyed, new bone is deposited, and thus the mischief is often repaired.—I have met with two such cases in children.

16. *M. Fungus cranii, or medullary sarcoma* of the bones of the skull, is occasionally observed. It has been described as occurring on the top of the cranium by CRELL, SANDIFORT, WISHART, ABERCROMBIE, LANDMANN, and OTTO. A distinct tumour is often produced by it on the internal as well as the external surface of the skull,—the part forming a spongy growth. It is more rarely met with about the base of the cranium. It may originate in the bones, or their internal or external periosteum; but, in whichever of these it may commence, it soon involves them all. When originating in the bones, it usually assumes the characters of *osteosarcoma*, and those of *fungus* when it commences in the pericranium or the dura mater.

17. *N. Perforations* of the cranial bones are

also observed, generally as a consequence of the pressure of internal tumours, of an encysted, scrofulous, or fungoid description, attached to the membranes underneath, or of aneurisms, &c. Cases of this description are recorded by PALLETTA, LE CLERC, RICHTER, PELLETAN, and OTTO. After artificial perforations of the skull, as after trephining, and fractures with loss of bone, osseous matter is sometimes regenerated, radiating from the surrounding divided surface of bone. The exuberant formation of ossific matter after fractures of the cranium is sometimes productive of serious effects. (See § 11.)

18. *O. Depressions and fractures* require little notice further than that they are the most frequent causes of inflammation, and its consequences in the surrounding membranes, and contained organs, and of irregular bony depositions. Depression of the superior and lateral bones of the skull may take place in early age to a very great extent, and remain through life, without affecting the mental manifestations. Several instances of this have come before me, in some of which the depression was fully larger and deeper than the bowl of a large table-spoon. One of my earliest and most talented friends has a depression to this extent in one of the parietal bones, from an accident in childhood.

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CRETINISM. — SYN. *Cagots, Struma Tyrolensium*, Gautier. *Crétin, Crétinisme*, Fr.

CLASSIF. — 6. Class, 1. Order (Good).

I. CLASS, IV. ORDER (Author).

1. DEFIN. — *Imperfect formation or development of the cranium, and the whole of the body, with mental imbecility, and physical imperfection, varying chiefly in degree.*

2. This state of imperfect physical and mental development, rather than of diseased action, was first noticed by PLATER among the poor of Carinthia and the Valais, where, and in the valleys of the lower Alps and Switzerland, it is endemic. But it is not peculiar to these places; for it has been observed in the valleys of the Pyrenees by RAYMOND, in some parts of Salzburg by KNOLZ, and in various other localities in the central and southern countries of Europe, as well as in Chinese Tartary, according to Sir G. STAUNTON.



M. DE SAUSSURE, ACKERMANN, FODÉRÉ, IPHOF, ERHARD, the WENZELS, and KNOLZ, have given us the best descriptions of this state of mental and bodily deformity, in respect both of its nature and causes. The brief account of it by Dr. Good is both imperfect and erroneous, and must have been written in perfect ignorance of the descriptions of the above eminent observers, as well as of others deserving of perusal. He very inaccurately associates it with bronchocele on the one hand, and with rachitis on the other; with the former of which it is not necessarily, although very frequently, connected, and from the latter it is totally distinct.

3. I. DESCRIPTION.—Cretinism presents various modifications in kind, and every intermediate grade between that extreme degree of physical and mental debasement which is characterised by the utmost deformity and entire absence of mental manifestation, the organic or vegetative functions only being performed, and that condition which may be considered as very nearly approaching the healthy constitution of man. There are certain circumstances which distinguish cretins from other idiots, viz. *a.* They present certain bodily deformities, which are seldom or never observed in other idiots; and, *b.* Their physical and mental infirmities are always the result of endemic causes.

4. In general, some degree of goître is attendant on cretinism, but not invariably. Professor KNOLZ states that it is sometimes absent, and occasionally slight, the thyroid gland being enlarged in no greater proportion than several other glands are in the same subject. The stature is seldom above four feet and a half, often much less; the cranium is deformed and has a conical shape—the forehead being thrown backwards, narrowed, and flattened, and the occiput being nearly on a line with the neck; the flesh is soft and flaccid; the skin wrinkled, yellowish, or pale and cadaverous, dirty, and covered by chronic eruptions; the tongue is thick, and hanging out of the mouth, which is open, large, and slavering; the lower jaw is elongated and prominent; the eyelids are thick, the eyes red, small, but prominent, watery, and frequently squinting; the nose is flat; and the whole countenance is idiotic or expressive only of lasciviousness. The belly is large and pendulous; the neck either short and thick, or long and thin; the limbs crooked, short, distorted, &c.; and the gait imperfect and waddling. The senses are more or less defective, or altogether abolished; the cretin being often deaf and dumb, and those who possess the faculty of speech expressing themselves imperfectly and with difficulty. The intellectual functions are either entirely absent or imperfectly developed, whilst the organic or vegetative functions are in a state of increased activity; cretins being voracious, lascivious, and addicted to masturbation. They appear to have no other enjoyment than eating and sleeping; and their insensibility is often so great, that they obey not the calls of nature. In some instances, the bodily deformity is not so remarkable as that now described; imbecility, flaccidity of the soft solids, with bronchocele, constituting the extent of infirmity.\*

5. The cretin, like most idiots, seldom attains an advanced age; indeed, few of them reach upwards of thirty years. CLAYTON remarks, that although they die early, they soon present the appearance of age. They are usually of the lymphatic temperament, with light hair and grey eyes; the female cretin having enormously large and pendulous breasts. The less debased among them marry, rarely with one another, but do not propagate cretinism, the predisposition only to it being derived by the offspring from the parents. MALACARNE (*Mém. de l'Acad. de Turin*) attributes the mental debasement to the contraction of the bones of the cranium, which prevents the cerebral organs from acquiring their natural dimensions and functions; and ACKERMANN espouses a nearly similar opinion. The conformation of the body is generally stated not to be congenital, although, at birth, the cretin may appear weak, puny, or sickly. It usually comes on gradually from birth; and M. DE SAUSSURE states, that children who, living in the localities where it is endemic, and are not affected at eight or ten years, generally escape it; and that infants who are brought into these districts at a very early age, are equally subject to it with those who are born in them.

KNOLZ:—The whole body is stunted, its height not exceeding four feet. There is a total want of due proportion between its different parts: the height of the head, with reference to the rest of the body, being 1-4th or 1-5th, instead of 1-8th, the natural proportion. The neck is strong, and bent downwards. The mammæ are very voluminous and pendent; the upper limbs reach below the knees; the arm is shorter than the fore-arm; the chest narrow; the abdomen hemispherical, and of a length not exceeding the height of the head; the penis and scrotum come down to the knees; the thighs are, with the haunches, of a greater width than the shoulders, and are shorter than the legs, the calves being almost wanting; the foot is small, and the toes partly distorted; the lower extremities are shorter than the upper half of the body. In the head, the masticating organs, the lower jaw, and the nose, preponderate considerably over the organs of sense and intelligence. The skull is depressed, and forms a lengthened and angular ellipsis; the receding forehead presents, internally, large frontal sinuses, to which the brain has yielded a part of its place; the top of the head is not vaulted, but flattened; the occiput projects but slightly, and runs almost even with the nape of the neck, as in ruminating animals. The face is neither oval nor round, but spread out in width; the parts of which it is composed being wide and short, and the maxillary bones projecting greatly. The forehead is narrow, flattened, and low; the eyes are unusually far apart, diverge slightly, and are small, and seated deep in the orbit; the pupil is contracted, and not very sensitive to light; their external angles are situated higher than the internal; the eyelids, unless when dropsically swollen, are flaccid and pendent; the look is a fixed stare without expression, and turns with indifference from all that is not eatable. The root of the nose is widened and depressed, the bones of the nose square; the zygomatic bones are wide, and extremely projecting: the external ear is large, stands out from the head, and hearing is very defective. The elongated form of the lower jaw of the cretins, and their thick and padded lips, make them resemble ruminating creatures more nearly than man. The tongue is thick, and rather cylindrical than flat; the saliva is continually running from the angles of the mouth. Enlargement of the thyroid gland is recognised as one of the signs of cretinism; but its size is no sure guide to the extent of the existing infirmity. The throat presents, also, other obstructed glands. The thorax is generally narrow and flat; the abdomen is usually distended with gases, and largely developed towards the chest; the flesh of the extremities is flabby; the knee of an irregular shape, and usually bent; the fingers are very long and lank, and the nails very small. The upper part of the vertebral column being directed more or less forward, and the lower part, with the basin, being pushed backward, the sacrum assumes a more horizontal, and the other pelvic bones a more vertical position, than in the healthy formation. Besides the masticating and digestive organs, those of generation are also strongly developed, especially in the male. (*Medecin. Jarbucker des k. k. Æsterr. Staates*, b. i. st. l. 1829, p. 86.)

\* The following account of the "*Fexes*," or cretins of Salzburg, is abridged from that given by Professor



6. II. CAUSES.—The principal, if not the only, cause of cretinism is dwelling, during infancy and childhood, in deep, narrow, moist, and malarious valleys, situated at a lower level than 3000 feet above the ocean, where the air is stagnant, and the solar beams intercepted by the mountains. MM. FERRUS, GEORGET, and the authors already referred to, state, that cretins become numerous in proportion as the valleys sink below this elevation. In addition to those causes, may be added the poverty, ill-feeding, drunkenness, indolence, dirtiness, sensuality, and low debauchery of the parents,—circumstances tending to the production of an infirm and deformed offspring; the inactivity and filth into which children who begin to evince signs of cretinism are allowed to sink, and the influence of water holding calcareous and other mineral substances in solution. MM. DE SAUSSURE and FODÉRÉ, however, deny that the water is concerned in the production of this infirmity; but MM. BALLY and RAMBUTEAU show that much is owing to it in the causation of cretinism, as well as BRONCHOCELE (see that article). The last named authority states that the offspring of the natives of Valais, who intermarry with persons from the Italian side of the Alps, are more subject to cretinism than those born of native parents; that females who have husbands from the higher Alps seldom have children affected by this infirmity; that wherever cretins are seen, goître is also prevalent; but that the latter is found in places where the former does not exist; and, consequently, that the same causes that occasion goître, when present in an intense degree, also produce cretinism.

7. III. The TREATMENT of this infirmity is necessarily preventive rather than curative, and consists of the amelioration of the physical and moral condition of the parents; of the removal of infants, as soon as signs of the malady manifest themselves, to more elevated and open localities, and to mountainous districts, to enjoy a purer air and stronger light; of obliging them to exert themselves in some useful and suitable employment, and to pay attention to personal cleanliness; of frequent ablutions, followed by active and stimulating frictions of the whole surface of the body; of the use of stimulating tonics (ERHARD); and of allowing them a stimulating and strengthening diet, with a large proportion of animal food. JOSIAS SIMLER, who wrote in 1574, states that the malformation, constituting the physical infirmity, is sometimes congenital; and probably it is so occasionally. In such cases, it is not likely that much advantage will accrue from any means. M. RAMBUTEAU, however, states that it is scarcely ever congenital; but it is not unlikely that experienced observers may predicate, from the appearance of the newly born infant, whether or not it is likely to become the subject of this dreadful infirmity—may observe that state of developement and formation, which, if not actually the incipient malady, is predisponent to its occurrence.

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CRISIS.—SYN. Κρίσις, a judgment or decision (from κρίνω, I judge or determine). *Judicium*, *Judicatio*, Lat. *Entscheidung der Krankheit*, Ger. *Crise*, Fr. *Crisi*, Ital.

CLASSIF.—PROGNOSIS.

1. Crisis may be defined a sudden change during the height of a disease, tending either to recovery or to death. Critical changes have been much regarded in the prognosis and treatment of diseases, from the time of HIPPOCRATES, who first mentioned them, and the days on which they occur, down to the present period. ASCLEPIADES, and the methodists, however, denied their influence, and disputed the existence of critical days. GALEN and his followers attached great importance to them. It is recorded, that, having been called to a patient—a young man—with two disciples of THEMISON, GALEN prognosticated a favourable change by a critical hæmorrhage. The opinion was ridiculed by the two methodists, who advised blood-letting; but it was soon verified, for the patient had a copious epistaxis, after which he recovered. It is unnecessary to allude to the writers who have contended for the importance of this subject: they comprise most of the eminent names in medicine, from HIPPOCRATES to CULLEN, PINEL, FRANK, HILDENBRAND, and KREYSSIG. The titles of many hundred volumes that have been written upon it might be adduced in proof of the consideration attached to it: and although much more has been imputed to critical evacuations, and days, particularly by the humoral pathologists, than legitimately belongs to them, and granting that too devoted an attention to them has induced many to adopt injudicious indications, and weak measures of cure, yet some reputation will be acquired from the prognosis which an acquaintance with them will enable the physician to give; and much benefit will result to the patient from the treatment which this knowledge will suggest.

2. Since the overturn of the humoral pathology, the doctrine of critical evacuations has undeservedly fallen into disrepute, although the eminent writers who contributed most to the overthrow are amongst its most rational and warm espousers. In our own country, at the present time, too little attention is paid to these evacuations, and still less to the periods at which they occur. There can be no doubt that the former is the most important; but the latter part of the subject should not be disregarded. After all that has been urged in favour of, or in opposition to, the doctrine, I may conclude that, in temperate climates, a number of diseases, particularly fevers, run on for certain periods with regularity, and, after an exasperation of the symptoms, or some violent perturbation of the economy, terminate by evacuations of different kinds, which tend to remove the train of morbid actions, and to restore the healthy functions. In other cases, the exasperation of disorder is followed by imperfect evacuations, occurring in an irregular manner; whilst in some it gives rise to



additional phenomena of a dangerous or fatal character: hence crises have been denominated *salutary* and complete, *imperfect* and *fatal*. It was considered by the older writers requisite to a salutary crisis, that the evacuations constituting it should be attended by favourable symptoms, and be copious and manifest; and not only appropriate to the disease, but also consistent with the state of the patient. An imperfect crisis was considered *better* or *worse*: the better state alleviating the malady; the worse rendering it more severe and dangerous, from the supervention of metastases and complications. Having described the phenomena which are critical, I shall next notice the periods of disease at which they are most frequently observed.

3. I. CRISES manifest themselves,—1st. ON THE SKIN: *A.* by sweats; *B.* by acute or chronic eruptions. 2d. IN THE CELLULAR TISSUE: *A.* by swellings in various parts; *B.* by boils and carbuncles; *C.* by gangrene; and *D.* by purulent collections. 3d. IN THE GLANDS: *B.* by buboes; *B.* by swelling of the parotids; *C.* by salivation; *D.* by a flux of urine. 4th. ON THE MUCOUS SURFACES: *A.* by increased excretion—*a.* from the nose; *b.* from the bronchi, &c.; *c.* from the stomach (vomiting); *d.* from the bowels (diarrhœa); *B.* by sanguineous exhalation—*a.* by flux—*a.* the hæmorrhoidal; *β.* the menstrual; *b.* by hæmorrhagy; *α.* from the nose (epistaxis); *β.* from the bronchi (hæmoptysis); *γ.* from the stomach (hæmatemesis); *δ.* from the intestines; *ε.* from the uterus (menorrhagia); *ζ.* from the urinary organs (hæmaturia).

4. 1st. *A. Sweats* are salutary crises in continued and bilious fevers, in inflammations of the lungs and liver, in bronchitis, and less frequently in rheumatism. FRACASTORI describes an epidemic putrid fever which generally terminated favourably in this manner. Acute dropsy, particularly anasarca, when caused by interrupted perspiration, sometimes disappears after copious sweats. This evacuation is usually preceded and indicated by a soft, full, open pulse; by a diminution of the alvine evacuations; by softness, and occasionally slight itching, of the skin; and by increased colour of the cheeks. A salutary sweat should be distinguished from such as are limited to the forehead or face, and the neck or breast, whilst the rest of the body is dry; or those which cover only the lower extremities: these constitute merely partial or incomplete crises, and merely diminish the violence of disease.

5. *B. Eruptions.*—Miliary and vesicular eruptions only are critical: the others are merely symptomatic, or even form a part of the disease; as erysipelas, purpura, petechiæ, &c. A miliary eruption is favourable, if the symptoms subside, if the patient feels an itching or pricking, if they be general, and do not appear before the seventh day: if they be unattended by fulness of the surface; and if their subsidence be followed by vomitings, hiccup, or convulsions, they indicate a fatal termination (LANDRÉ-BEAUVAIS). Sometimes a miliary eruption comes out at different periods, and prolongs the disease, when partial relief follows it, each appearance being an incomplete crisis. Many chronic eruptions may not only be complications of visceral disease, but occasionally imperfect crises,—they alleviating the internal malady. They are more rarely completely salutary.

6. 2d. *A. Swellings of various parts*, as of the face or neck, the hands, the lower extremities, &c., have been considered as partial crises in ataxic and gastric fevers, and in exanthematous diseases. *B. Boils* are critical in some complaints, particularly towards the termination of acute diseases, especially small-pox. *C. Gangrenous pustules* or *anthrax* occur in malignant or pestilential fevers; *gangrenous escars* also are met with in similar cases, as well as in typhoid or adynamic fevers, particularly about the sacrum, and in places which have been blistered, or pressed upon. If, in such cases, the febrile symptoms subside upon the sphacelation, and if the gangrenous change be rapidly and distinctly circumscribed, it may be favourably critical; but if the symptoms continue, and the pulse becomes more frequent, weak, small, and soft, the local mischief is entirely symptomatic, and indicative of an unfavourable termination. *D. Purulent collections* are indicated by the continuance of the disease without any considerable evacuation, or exhaustion; by a sense of chill, horripilation or rigor, occurring at intervals, without any manifest cause; by the discharge of much clear urine; by partial sweats; by a softness of the pulse; by a remittent or hectic fever, and by flabbiness of the soft solids. The favourable changes of this nature occur in the extremities, and suppurate easily and rapidly. Those that are unfavourable take place in some internal viscera.

7. 3d. *A. Buboes* chiefly belong to pestilential fevers; but they are occasionally observed in the adynamic fevers of temperate climates. They indicate a favourable or fatal crisis in the manner stated with respect to gangrenous escars. *B. Swellings of the parotids* occur in low or malignant fevers; and appear either alone, or with other critical changes. They are commonly preceded by a slight rigor; by severe headach, stupor, noises in the ears, and deafness, with paleness, swelling, and sometimes redness of the countenance. This occurrence is rarely critical, and, of itself, furnishes no sure indication of the issue: if accompanied with favourable changes, it becomes an additional sign of returning health; but if the swelling is slow, or disappears in a very short time, the other symptoms still continuing, it is a dangerous circumstance. *C. Salivation* was noticed by SYDENHAM as a principal critical evacuation in the fevers of 1667 and 1668; and it occurred in the epidemic that prevailed at Breslaw in 1700. It occasionally supervenes in some forms of cynanche, and in bilious and gastric fevers. *D. The urine* is sometimes discharged copiously at the height of febrile and inflammatory diseases; and is to be viewed as a favourable occurrence. It is usually clear when recently evacuated, but deposits soon afterwards a whitish or rose-coloured sediment. The symptoms indicating this discharge are very obscure. Some authors have noticed the "*pulsus myurus*," which consists of every three or four successive pulsations being progressively diminished. A sense of weight below the hypochondria; of gravative tension in the hypogastrium, and of heat in the urinary organs, is stated by M. LANDRÉ-BEAUVAIS to precede this evacuation.

8. 4th. *A. a. Coryza*, or sero-mucous excretion from the nose, is sometimes critical in continued fevers; but little importance is to be attached to



it. *b. Mucous excretion* from the *bronchi* is frequently a partial crisis in several fevers, and in inflammations of the thoracic viscera (see BRONCHI and LUNGS). *c. Vomitings* are rarely indications of a perfect crisis; they occasionally, however, favour the development of those changes which precede a favourable termination of disease. They are sometimes ushered in by a bitter taste in the mouth, yellowish fur on the tongue, suborbital pain, and headach, nausea, salivation, coldness of the extremities; and frequency, and occasionally intermissions, of the pulse. *d. Diarrhæa* and copious alvine evacuations are favourable crises in nearly all acute, and even in some chronic diseases. But it is necessary that they should be feculent or bilious, and homogeneous—not watery or flocculent: if they approach to a natural, or have a yellowish brown, colour, and are followed by abatement of fever, &c., a favourable crisis may be confidently looked for. The chronic diseases, in which they indicate a change tending to health, are congestions and inflammations of the liver and spleen, hypochondriasis and melancholy, slight or incipient dropsies, rheumatism, and gout. They are usually preceded by borborygmi, with slight flatulent distension of the abdomen; flatulence and eructation; a sense of tension and uneasiness in the lumbar region; flying pains in the extremities; and a developed but unequal pulse, occasionally with irregular intermissions.

9. *B. Sanguineous exhalations* are often critical in the more inflammatory states of fever, and in the phlegmasiæ. According to HOFFMANN and LANDRÉ-BEAUVAIS, discharges of blood from the nose, the hæmorrhoidal vessels, or the uterus, are equally salutary in ardent fevers. In general, these hæmorrhages are preceded by depression of the morbid temperature, and erethism of the skin; by slight horripilations of the limbs; by a more open and rebounding pulse; and a sense of heat, pruritus, and tickling, in the part whence the evacuation is about to proceed. *a. The menstrual flux* is sometimes a rapid crisis in fevers and phlegmasiæ. It is indicated by dull heavy pains in the loins, groins, and tops of the thighs; by tension in the hypogastrium; heat and pruritus of the genitals; pallor of the face, and a dark circle round the eyes; swelling of the breasts; pale, scanty urine; horripilation, and erethism of the skin; and by a quick, sharp, and unequal pulse. Very frequently the menses appear at the regular period, or a little earlier, or later, in fevers and inflammations, without affording any, or but imperfect relief. In these cases, they should not paralyse the activity of the treatment. When they occur at or before the usual time, are abundant, and are attended by evident benefit, they should be considered as critical: but if they are delayed, or are difficult or scanty, they are imperfect crises, and should not interfere with the measures which the circumstances of the case may require. *b. The hæmorrhoidal flux* is often critical in inflammatory fever, pneumonia, hepatitis, and other phlegmasiæ. STAHL states that a return of this discharge is sometimes favourable in inflammations of the brain, and particularly in hepatitis, nephritis, melancholia, hypochondriasis, and mania. The observation is certainly correct. This evacuation is indicated by pains in the loins and the groins; by a sense of uneasiness and pressure towards the anus and perineum; by fre-

quent desire to pass the urine and go to stool; by flatulence and borborygmi, slight pallor of the face, and fulness of the hypochondria; and by fulness and inequality of the pulse as to strength. *c. Critical epistaxis* was considered of great importance by the older physicians, who paid much attention to the symptoms indicating its accession: these are, redness, with slight tumefaction of the face and eyes; reddish or brilliant objects floating before the eyes; the involuntary shedding of tears; weight of the temples, and beating of their arteries; deafness, or noises in the ears; slight delirium, or vertigo; a sense of tension in the neck, with distension of its veins; a dull pain in the forehead, and at the root of the nose, or an itching and tickling in the nostrils; a quick, hard, full, and an unequal pulse; frequent and slightly laborious respiration; sometimes with tension or oppression, without pain, at the præcordia. Occasionally, pallor, and constriction of the whole surface, coldness of the lower extremities, and horripilations, also precede a critical epistaxis. This crisis is most common in young persons, and adults whose vital energies have been previously unimpaired, and who have been subject to this evacuation. It occurs most frequently in summer and autumn; in the more inflammatory states of fever: in the acute phlegmasiæ affecting the super-diaphragmatic organs; and rarely in hepatitis. If the discharge consists of a few drops only, it is an alarming symptom; and although it be copious, if not soon followed by amendment, it is unfavourable. When excessive, and attended by syncope, convulsions, loss of power, partial or cold sweats, and cold extremities, it is a fatal sign. A syncope, however, which terminates the epistaxis, is often followed by recovery (LANDRÉ-BEAUVAIS).

10. *d. Hæmoptysis, hæmatemesis, hæmaturia, and intestinal hæmorrhagy*, are always false or unfavourable crises. They are generally preceded by tension and tenderness of the hypochondria; and supervene most frequently in adynamic, malignant, and pestilential fevers; in confluent small-pox, scarlatina maligna, and in scurvy: they occur less frequently in females than in males.

11. *A.* The above are the phenomena which have usually been considered critical by the older, and which are admitted by the best modern, medical writers; as well as the symptoms which indicate their accession. There are, however, still some circumstances connected with them deserving of notice. *a. The hæmorrhagic evacuations* occur most frequently in the spring, or in dry summers, in persons from 15 to 35 years of age, of a sanguine or irritable temperament, and in acute complaints. *b. The cutaneous evacuation* is most common in summer and autumn, in robust and fat persons upwards of 30 years of age, and in continued, remittent, and intermittent fevers. *c. A critical diarrhæa* is most frequent in autumn, in persons of a bilious temperament, and in remittent and intermittent fevers. *d. Discharges of urine* are observed in all ages, in all seasons, particularly winter and spring, and in all acute diseases.

12. *B.* Critical evacuations are — *a. rare*, in persons enfeebled by age, or by some other antecedent disease; in very moist and very cold, or very hot climates; during remarkably sudden and great vicissitudes of weather; and especially



when the vital energies are much reduced by a lowering and an evacuating treatment. *b.* They are not always similar in the same diseases; and they *vary* in respect of the nature of the discharges, and of the periods at which they take place, as well as of the organs by which they are produced. A favourable change in gastric, bilious, and adynamic fevers, is often attended by alvine discharges of a homogeneous, fluid, yellowish, yellowish brown, or brownish black appearance,—in inflammatory fevers, in young men, by epistaxis, often occurring on the seventh day,—in these diseases, in young women, by a copious flow of the catamenia taking place on the same day,—and in men of middle age, by sweats, or by some other discharges coming on the fourteenth, or at a subsequent period. Catarrhal and bronchial complaints terminate with expectoration, or with sweats, or a copious flow of urine, &c.

13. *C.* The *duration* of critical evacuations is very uncertain. The hæmorrhagic, the alvine, and the urinary, seldom continue longer than twelve or twenty-four hours, sometimes even much less. Sweats and expectoration are occasionally of no longer duration; but, in the majority of instances, these two evacuations are prolonged several days before the disease is entirely subdued. Purulent collections and gangrene may take place in a few hours, but they generally require a much longer period.

14. *D.* Critical discharges cannot be *changed* or *determined* in their route or period of eruption, by art; and when they supervene, they cannot be safely interfered with, unless they threaten life by their excess. If they be interrupted by accident, or by an injudicious and meddling practice, they are followed by unfavourable metastases and complications, or sequelæ, sometimes terminating in organic change, and death. Thus, when the perspirations which occur upon the change in fevers, and some of the exanthemata, are interrupted, effusion often takes place from serous surfaces, or into the cellular tissue. The most active vascular depletions can never compensate for the suppression of an abundant menstrual or hæmorrhoidal flux, occurring at the acmé of acute diseases;—the effects of art are here unequal to those produced by nature. Hence the advantage of recognising critical evacuations, even although we may not otherwise confide in them. Although it is thus important to attend to them in our prognosis, and especially in the treatment, when signs of their accession appear, or when they are actually present, yet the expectation of their occurrence ought never to interfere with or prevent the adoption of judicious intentions and means of cure. Even granting, with HAHNEMANN, that they are not to be imitated by art, still they furnish several useful indications. “*Quo natura vergit, eo ducendum est,*” may occasionally be adopted, after a careful consideration of the changes of which they are the effects, but not the causes. Much mischief has accrued from considering critical evacuations as the causes, and not as the consequences, of changes that take place in the economy at the acmé of acute diseases. REIL has touched upon this fallacy, but has not considered the nature of the changes of which critical evacuations are the effects, or attempted to explain the manner of their accession.

15. II. CAUSES, &c.—*A.* We have seen that crises take place chiefly from eliminating or excreting surfaces and organs; and that they consist of a copious irruption of either previously suppressed secretions and excretions, or an accustomed sanguineous evacuation; but the causes which occasion, and the changes which precede them, are not so readily recognised. When we consider of what they consist, especially in relation to the fact of their occurrence only in maladies characterised in their earlier stages by interrupted secretion and excretion, and by morbid excitement of the vascular system—the vascular excitement being perpetuated and variously modified by suspension of the visceral functions now mentioned, or by local irritation, or by both—we shall arrive at a tolerably accurate inference respecting the causes of crises, and the importance that ought to be attached to them. There are few facts in pathology better established than that vascular excitement, when it reaches a certain height, or assumes an inflammatory form, impedes, interrupts, or even arrests, the natural functions of secreting or glandular organs; whilst a lower grade of excitement, unattended by inflammation, generally increases the functions of the organ thus affected. Therefore, when excitement continues to be expressed chiefly in the vascular system generally, secretion and excretion continue impeded or entirely suspended; and the effete materials, which, under other circumstances, are continually being removed from the circulation, accumulate in it, perpetuating and modifying the vascular excitement until it becomes exhausted, and until the accumulated noxious materials in the blood irritate the viscera destined to remove them, and thus incline the balance of excitement from the general vascular system to eliminating organs. Hence the occurrence of critical evacuations at the acmé of acute diseases; and hence their importance as indications of change in the states,—1st, of vital power; 2d, of vascular action; 3d, of the circulating fluid; and, 4th, of the functions of secreting and excreting viscera. As crises have been neglected or confided in according as they agreed with the doctrines of the day, and have, in modern times, shared the fate of the pathology on which they had been so long grafted, I shall attempt to illustrate this view by a reference to one of the very common circumstances in which they are observed. A person exposed to the causes of autumnal fever of a bilious and remittent form, experiences during the earlier stages the usual symptoms of impeded or interrupted secretion and general vascular excitement, with evening exacerbations. In consequence of interrupted action of the emunctories, the blood contains an increasing proportion of effete materials, particularly of the elements out of which bile is formed. These for a while increase and modify the vascular excitement, or, when excessive in quantity, or especially noxious in quality, even tend to exhaust or depress it; but they, at the same time, being appropriate stimuli to the biliary and depuratory viscera, serve to restore their impeded functions, to turn the balance of excitement in favour of them,—thereby to reduce the morbid vascular action, to cleanse the circulating fluid from its impurities, and to change in other respects its condition; and thus the disease terminates with an apparent collapse,



followed by a copious discharge from the bowels, consisting of morbid bile, and of the excretions from the intestinal mucous surface—the products of the noxious matters which had accumulated in the blood, but which is now being eliminated from it by a renovated, as well as an increased, secreting and excreting function. Now, this procession of morbid phenomena is consistent with what I have repeatedly observed in both temperate and warm climates; and shows that the ancients were not so far wrong as many of the moderns suppose, when they believed that critical evacuations were beneficial chiefly because they conveyed a morbid matter out of the system; and therefore could never be perfectly compensated for, or imitated by, art.

16. But it may be objected, that this explanation is based entirely upon the opinion that the circulating fluid becomes altered, owing to interruption of the various secreting and excreting functions; and that it cannot obtain in those cases wherein no such interruption appears to occur. In this case, it is very probable that critical changes are effected in a great measure by the vital influence of the frame. Even according to the foregoing view of the subject, the agency of the vital endowment must not be left entirely out of consideration; for, without its reaction, through the instrumentality of the different internal organs with which it is associated, upon the morbid matters affecting it, those matters could not be separated from the circulation and expelled from the system. It seems, therefore, more than probable that crises consist, in the majority of cases, of more than the simple excretion of the accumulated effete matters from the circulation—such excretion being merely the effects of an anterior and still more important and more constant change. The attentive observer of the phenomena successively occurring during the progress of disease must have sometimes remarked, in those maladies especially, wherein the vital manifestations are particularly implicated, certain perturbations or struggles occurring at their acmé, either followed by recovery, but without any very manifest evacuation—at least to the extent of explaining the circumstance; or passing into exhaustion and death, sometimes without any organic change to account for the issue. In such cases, we can merely infer, that the vital endowment of the frame resists or opposes changes in the state of the structures with which it is associated; that it does so successfully in the former, and unavailingly in the latter, of these cases; and that, unless its energies are overwhelmed by very powerful and noxious causes, as occasionally is observed, it thereby tends to prevent the dissolution of this association to which such changes might directly or indirectly lead. This vital manifestation—whether denominated the “*vis medicatrix naturæ*,” or vital resistance, or vital reaction, &c.—most certainly obtains in a very large proportion of diseases, and is instrumental in the development of those changes, which immediately or mediately conduce to recovery, and which, in the more extreme cases, are attended by various phenomena indicating the vacillating predominancy of vital and functional power, or of organic disease; the acquired ascendancy of either over the other occasioning, as the case may be, a favourable or an unfavourable crises. That such

a struggle for the ascendancy should manifest itself favourably at certain periods, or on determinate days, in preference to others, can be explained only by considering it a law of the living economy identical with, or related to, the periodicity of vital action observed in the healthy, and still more apparently in the diseased functions.

17. *B.* Numerous illustrations of the following propositions might be adduced, in addition to that now advanced:—*a.* Evacuations occurring at the height of acute diseases are often among the first indications of, and are, indeed, occasioned by, the subsidence of local or general vascular excitement. *b.* In many febrile diseases, crises are brought about by the excretion—under the influence of vital reaction or resistance of the secreting viscera—of the effete matters accumulated in the blood, or upon internal organs and surfaces, owing to interrupted excreting function, as shown above. *c.* When a crisis is attended by apparent collapse or change of action, this may arise either from the vital reaction of internal secreting organs occasioning a derivation from the periphery to the more central parts of the frame, or, from the previous exhaustion or subsidence of the vascular excitement allowing the secreting and excreting organs to resume their functions when excited by their appropriate stimuli in the accumulated elements of their respective secretions. *d.* When crises consist of sanguineous fluxes or discharges, they are occasioned, in great measure, by the vascular plethora consequent upon impeded secretion, together with local determination to, or congestion of, such mucous surfaces or organs as are most disposed, by original conformation, previous disease, or established function, to these changes. *e.* That a favourable crisis may manifest itself in one organ or function, or in two or more, either simultaneously or successively, as by sweats, or by alvine or urinary discharges, or by expectoration, &c. *f.* When, during the progress of disease, the aqueous and albuminous elements of the blood become excessive, or when noxious matters accumulate, and are not eliminated in the form of crises as above stated, or by medical aid, they may so affect the capillaries in the parenchyma of the organs, or in serous surfaces, as to give rise to various organic changes and effusions. These may be viewed as *unfavourable* crises, determined to vital organs and internal cavities, arising from deficient vital energy, or vital resistance and reaction, or predisposition, or constitutional vice of some organ or part; each of which may obtain either alone, or with local or general plethora produced by interrupted secretion, &c.

18. *C.* Critical terminations are observed most frequently in the more inflammatory, the bilious, the gastric, and the intestinal forms of fever; in the different phlegmasiæ, in some hæmorrhagic diseases, and more rarely in chronic maladies. They are more commonly remarked in some epidemics than in others; and are seldom apparent, as justly remarked by LENTIN, in putrid or malignant diseases, and, I may add, in the pestilential fevers of warm climates. In these, the depressing and contaminating influences of their causes, and of the states of the secretions upon the nervous energy, on the circulation, and subsequently upon the soft solids, so far subdue the vital influence as to render its resistance unavail-



ing in the morbid strife; and it becomes insufficient to separate and throw off the polluting matters, which ultimately increase so as altogether to overpower it. The chronic maladies in which crises are sometimes met with are — mania, hypochondriasis, melancholy, and idiopathic dropsies. But there are numerous circumstances which prevent their occurrence in the above diseases. In this country they are more rarely observed than they would otherwise be, if the treatment of the diseases in which they commonly occur were left more to nature.

19. *D.* Amongst the most frequent causes that prevent the development of crises, particularly such as are favourable, may be enumerated — old age; the lymphatic temperament, and leucophlegmatic habit of body; previous disease, and disposition of structures or organs to organic change. Constitutional or local vice; the scrofulous, gouty, or rheumatic diathesis; exhausted vital power; inanition or general cachexy, particularly from innutritious or unwholesome food; and a too lowering or depletory mode of treatment relatively to the constitution and circumstances of the patient, not only obstruct the development of regular or favourable crises, but render them imperfect or unfavourable. The large depletions, and the copious and repeated alvine evacuations, very generally resorted to in the early stages of acute diseases, even although they may frequently ward off a fatal issue, often manifestly prevent the accession of regular crises, — 1st, by debilitating the patient, and thereby rendering the vital resistance insufficient for their full evolution; and, 2d, from the circumstance of these means of cure being substituted or artificial evacuations or crises, and preventing by anticipation and substitution those which are natural.

20. And here a most important question suggests itself, viz. *Whether or not it is better thus to substitute artificial, for the mere chance of the accession of natural evacuations?* As respects the phlegmasiæ, and many diseases, — particularly those, on the one hand, in which vascular action is excessive, and those, on the other, in which it is insufficient, and the vital powers are greatly depressed, — there can be no doubt of the propriety of resorting to artificial means to preserve an organ from the disorganising tendency of excessive action, and to raise the prostrate powers of life. Besides, it is excessive, and not moderate and judicious measures, which obstruct the evolution of favourable crises: the latter are even requisite aids to nature, in bringing about salutary changes, and a felicitous termination of disease. In respect, however, of many forms of fever, I believe that the *nimia diligentia* of the practitioner is as often injurious as it is beneficial, and that it disturbs those changes which can be effected only by time, and sometimes disposes to metastasis, complications, and unfavourable crises, by depressing the vital energies, and checking salutary changes at the early periods of their evolution, and before they become fully manifested. This fact was established by HILDENBRAND in respect of the typhoid and adynamic fevers which were epidemic through Germany from 1810 to 1816. He observed, that a much greater number of cases recovered when left in a great measure to nature, the physician interfering no further than to preserve vital organs

from dangerous congestions, than when a *medicina perturbatrix* was adopted.

21. III. The CRITICAL DAYS (*Dies indicatorii*) are those on which favourable changes usually occur. They are either *simply* or *especially* critical. The third, fifth, seventh, ninth, eleventh, fourteenth, seventeenth, twentieth, twenty-seventh, thirty-fourth, and fortieth, are critical days; the seventh, fourteenth, twentieth, and twenty-seventh being those which are especially critical. GALEN, and some other writers, mention the fortieth, sixtieth, eightieth, hundredth, and hundred and twentieth; but these are more doubtful, and can apply only to chronic diseases. The third, fifth, ninth, and, by some writers, the eleventh, and seventeenth, are often called *intercalary* days: on these, crises less frequently occur. The intervening days are *non-critical* or vacant, on which salutary changes very seldom take place. FORESTUS, DE HAEN, BORDEU, and various other authors, have entered upon calculations respecting the terminations of acute diseases on particular days; and it results therefrom, that about three fourths have observed regular periods. These periods are, however, not always the same in similar diseases. They vary with the age, the constitutional powers, the temperament, and the regimen of the patients. They are earlier, and much more uniformly observed, in robust persons, than in those who are weak and advanced in age.

22. That critical changes should so frequently occur on the days specified, cannot be explained otherwise than in the way attempted by CULLEN. He remarks that, from the universality of the tertian and quartan periods in agues, we cannot doubt of there being in the animal economy a tendency to observe such periods; and the critical days above mentioned are consistent with this tendency, as all of them mark either tertian or quartan periods. These periods are, however, not promiscuously mixed, but occupy constantly their several portions in the progress of the disease; so that, from the beginning to the eleventh day, a tertian period obtains; and from the eleventh to the twentieth, and, perhaps, longer, a quartan period is as steadily observed.

23. In entering thus fully into the exposition of the doctrine of crises, according to my belief, as deduced from observation, and the recorded experience of the best authors, I would recommend a judicious, but not a too partial, attention to them, excepting in fevers where morbid action has so far advanced that a determinate course must be reckoned upon; but, when any vital organ is threatened by disease, either originating in it, or attacking it consecutively, as in the progress of fevers and of the exanthemata, or when the vital powers are greatly reduced, although favourable crises may occur, they cannot be reckoned upon, and the expectation of them ought not then to prevent the adoption of decisive measures. When, however, they do supervene under such circumstances, the knowledge of the facts connected with them becomes of real importance, inasmuch as it acquaints us that the means of cure ought to be directed in such a way as not to impede or interrupt, but to develop and promote them. Their occurrence on certain days, in preference to others, should also induce us to watch the phenomena of disease at these periods with the utmost attention. It is true



that critical days have been denied by many of the moderns, upon the ground of their not having observed them. But, as Dr. CULLEN has well remarked, the fault is in the physician. He who will not observe closely and comprehensively, should not throw discredit on the results obtained by the more accurate and attentive enquirer. Authorities in matters of opinion are of little value; but in matters of fact, as in this case, they are testimonies—are positive evidences; and whoever will take the trouble to refer to several hundred authorities collected by PLOUCQUET, or even to those below (nearly all of which he has omitted), will find them sufficiently conclusive.

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CROUP. — SYN. *Affectio Orthopnoica*, Baillou.

*Angina Strepitosa*, Ghisi. *Angina Infantum*, Wilcke. *Cynanche Stridula*, Wahlbom. *Angina Suffocatoria*, Bard. *Angina Infantum Strangulatoria*, Russel. *Cynanche, vel Angina Trachealis*, Cullen, Johnston, Rush, &c. *Asthma Infantum Spasmodicum*, Simpson. *Suffocatio Stridula*, Home. *Asthma Acutum Infantum*, Millar and Cookson. *Morbus Strangulatorius*, Starr and Rosen. *Morbus Trulentus Infantum*, Van Bergen. *Angina Polyposa*, Michaelis. *Angina Membranacea*, Auct. Var. *Cynanche Laryngea*, Dick. *Orthopnæa Membranacea*, Laudun. *Tracheitis Infantum*, Albers et Frank. *Angina Laryngea Exudatoria*, Hufeland. *Laryngo-Trachéite*, Bland. *Empresma Bronchlemmitis*, Good. *Cauma Bronchitis*, Young. *Die Häutige Bräune*, Huhnerhüsten, Germ. *Trachéite, Croup*, Fr. *Strypsiucka*, Swed. *Croup, or Roup*, Scott. *Hives*, Amer.

CLASSIF. — 1. Class, Febrile Diseases; 2. Diseases of Sanguineous Function; 2. Order, Inflammations (Cullen). 3. Class, Order, Inflammations (Good). III. CLASS, I. ORDER (Author, in Preface).

1. NOSOLOG. DEFIN. — *Accelerated, difficult, wheezing, or shrill respiration; short, dry, constant,*

*clangous or barking cough; hoarse or altered voice; pain and constriction above the sternum, with symptomatic inflammatory fever; frequently, towards the close of the disease, expectoration of membranous, albuminous, or glutinous substances, occurring in children.*

2. PATHOLOG. DEFIN. — *Inflammation of the trachea, sometimes of the larynx and trachea, and frequently also extending to the large bronchi, occasioning albuminous and membranous exudation, more or less spasm of those parts; and terminating either in suffocation or exhaustion of vital power, generally in a few days, or within the period constituting an acute malady.*

3. LIT. HIST. — Although we had no precise account of croup until the work of Home appeared, yet there cannot be any doubt of its occasional occurrence among children from the earliest ages; and that it was confounded with other diseases affecting the throat and air-passages. HIPPOCRATES states, "*Angina Gravissima quidem est, et celerrimè interimit, quæ neque in faucibus neque in cervice quicquam conspicuum facit, plurimum verò dolorem exhibet, et difficultatem spirandi, quæ erectâ cervice obitur, inducit. Hæc enim eodem etiam die, et secundo, et tertio, et quarto strangulat.*" And BAILLOU, after describing an affection of the respiratory passages, observed in Paris, in 1576, with the nature of which he was unacquainted, remarks, "*Chirurgus affirmavit se secuisse cadaver pueri ista difficili respiratione et morbo (ut dixi) incognito sublato: inventa est pituita lenta, contumax, quæ instar membranæ cujusdam arteria aspera erat obtenta, ut non esset liber exitus et introitus spiritui externo: sic suffocatio repentina.*" That the above observations strictly apply to croup, there can be no doubt. Dr. BLAIR, of Cupar Angus, first mentioned, and shortly described, the disease by its present name, in his medical papers published in 1718. GHISI noticed it, as it prevailed in the north of Italy in 1747, by the appellation of *Angina Strepitosa*; STARR, in the *Philosophical Transactions* for 1749 and 1750, by the name of *Morbus Strangulatorius*; and WILCKE, as it occurred in Sweden during some years preceding 1764. After the descriptions furnished by HOME, and his Swedish contemporaries, HALEN and WAHLBOM, it received a place among specific diseases, and became the subject of a number of works, and even of controversial discussion. The treatises of SIMPSON, in 1761, and of MILLAR, in 1769, on the acute asthma of infants, gave rise to this latter occurrence, especially on the Continent. These authors, having observed the more spasmodic states of this disease, described them under the above designation; subsequent writers differing widely as to their being distinct maladies, or merely varieties of inflammatory croup, with predominance of the spasmodic symptoms. This point was warmly contested in the numerous productions which the prize offered by NAPOLEON, in 1807, called forth. My opinions respecting it will appear in the sequel.

4. I. HISTORY OF THE FORMS AND PROGRESS OF THE DISEASE. — Croup has been viewed, since its description by HOME, as an inflammation of the interior surface of the trachea and larynx. Some authors have divided it into three distinct varieties, namely, 1st, *Catarrhal croup*, or a slighter



form of the disease; 2d, *Nervous* or *Spasmodic* croup, or a slighter state of the inflammation, occurring in nervous and irritable temperaments, which influence the form and issue of the disease, giving rise to a spasmodic form of it; and 3d, *Inflammatory* croup, or that in which the inflammation of the air passages is carried to a greater height, and is always attended by the production of a membranous exudation. The opinion that croup consists of an acute inflammation, occasioning the production, in a number of cases, of a false membrane; in others, of an albuminous concretion of various degrees of density; in some, of a viscid mucous secretion, and of the inflammatory lesions of the mucous membrane itself, already described (see BRONCHI, &c. §3, 55.); has been attacked by M. GUERSENT and BRETONNEAU, who consider that the formation of a false membrane is the distinctive character of croup; and that those cases in which it is not formed, are merely what they term *false* croup. I agree with M. BRICHETEAU in considering that the distinction here contended for is calculated more to puzzle the inexperienced, than to advance our knowledge. The experiments of SCHWILGUE, JURINE, ALBERS, SCHMIDT, and CHAUSSIER, as well as pathological observation, prove that the form of disease called false croup by the above authors proceeds from a similar state of morbid action as that denominated the pure disease, and is merely a modification resulting from less intensity of the inflammation, peculiarity of the temperament and habit of body, the causes occasioning it, and the greater predominance of the spasmodic or nervous states. The experiments of the authors now referred to demonstrate, that the injection of irritating matters into the air-passages sometimes produces simple inflammatory irritation; in others, a thick, viscid, mucous exudation; and in many, particularly in young animals, a complete false membrane. These differences of opinion, which are not confined to the writers now mentioned, but extend to many of those quoted in the course of the article, will appear, from what is about to be advanced, as more apparent than real. That the disease should present numerous modifications, approaching acute bronchitis on the one hand, and identical with laryngitis on the other, and varying characters according to the portion of the air-passages chiefly affected, the temperament, habit of body, severity of inflammatory action, and association with other diseases, is an inference to which *a priori* reasoning may lead every practitioner. Without adopting the confined views of some writers, or the hypothetical doctrines of others, I shall be guided chiefly by an extensive experience in the disease, and consider it under the following heads:—1st, The symptoms and progress of true croup; 2d, The varieties or modifications of the disease most frequently observed; and, 3d, The complicated and consecutive forms.

5. i. THE USUAL FORM AND PROGRESS OF TRUE CROUP.—The *simple* and usual form of croup generally commences with more or less of precursory symptoms, and runs its course in a few days. It has been divided by authors into different stages or periods, more,—I believe, with the view of giving precision to their description, and to the treatment recommended, than from any

marked change in the character of the symptoms. M. GOELIS has divided it into four stages, viz. 1st, the invading or catarrhal stage; 2d, the inflammatory period; 3d, the stage of the albuminous exudation; and 4th, the period of imminent suffocation. A nearly similar division has also been adopted by Dr. CHEYNE. The difficulty of determining these various stages must be evident; and yet the advantages arising from a division of the disease into distinct periods must be evident,—not so much, however, for the purpose of description, as for the more strict appropriation of the means of cure. Premising, therefore, that croup, particularly this form of it, is strictly progressive, with no great change in its features, until towards its close; and that, therefore, all divisions of its course are merely arbitrary, and without any positive grounds in nature; I shall notice, 1st, its *precursory* signs; 2d, its *developed* and confirmed state; and 3d, the state of *collapse* and imminent suffocation.

6. A. The *precursory period*, *period of invasion* (GUERSENT), of *irritation* (ROYER-COLLARD), *catarrhal stage* (GOELIS), *febrile period* (DUGES). These precursory signs are sometimes well marked, and of a distinctly catarrhal nature, as observed by GOELIS: occasionally they are slight, chiefly of a febrile description; and either from this circumstance, or from the shortness of their duration, attract but little notice. The febrile symptoms, when present, consist chiefly of alternating chilliness and heat, or, in the more acute cases, of slight chills, followed by heat of skin, frequency and hardness of pulse, slightly flushed countenance, want of appetite, headach, excited or variable spirits, alternating with sadness, lassitude, &c. Often, in place of these, or in addition to them, there are a short cough, hoarseness, sneezing, coryza, sometimes moroseness, and all the signs of common catarrh. Upon examining the pharynx and mouth, no trace of inflammation can be detected in this form of the disease; but the tongue is generally white, and loaded at its base. The eyes are watery, red; and the eyelids darker than usual. These symptoms are sometimes only of a few hours' duration, or they may be present for two or even three days. In very young children, they may be so slight as to escape detection, whilst a somewhat different train of phenomena, such as heat of skin, chilliness alternating with heat, frequent short fits of coughing during the night, want of sleep, restlessness, indications of uneasiness about the throat, furnished by the frequent application of the child's hand to this part, &c. manifest themselves. The importance of ascertaining the invasion of the disease have led several writers to pay much attention to its precursory symptoms. VIEUSSEUX has attached much importance to the catarrhal signs, and change in the voice. But these are not by any means constant; and, even when present, may be merely the commencement of a slight catarrh; indeed, there is no symptom which can be relied upon, as indicating its approach, until the disease is nearly fully formed.

7. B. The *developed state of the disease* (the *Inflammatory*, of CHEYNE and HOSACK).—After the above symptoms have existed for a longer or shorter time, or in a more or less marked manner, hoarseness, if it have not previously existed;



sometimes a peculiar shrillness or puling of the voice; difficult, sibilous, sonorous respiration; and an unusual, dry, loud, clangous or ringing cough, as if passing through a brass tube, or sometimes resembling the barking of a puppy; are observed. This croupal cough scarcely admits of description, although it is readily recognised after having been once heard. The succussions constituting it are followed by a dry, hissing, slow, sonorous inspiration, resembling the sound produced by a piston forced through a dry pump, or by a crowing noise similar to that emitted by a chicken in the pip. Expiration between the cough is more easy than inspiration, but with precipitation; the pulse is frequent and hard; the skin hot or burning; the face flushed, sometimes covered with perspiration; the eyes are watery and prominent; the carotid arteries beat strongly, and the jugular veins are tumid. The head is now generally thrown backwards; and the child, either by its speech or attitudes, expresses a feeling of anxiety, with pain and constriction about the trachea and larynx, which are often slightly tumid externally. The above symptoms, which usually first appear during the evening or night, generally somewhat subside early in the morning, excepting the frequency of the pulse, the hoarseness of the voice, peculiarity of the cough, and the sibilous inspiration. This remission sometimes continues the greater part of the day; but after falling asleep, or towards evening, all the symptoms become more severe than ever; and the difficulty of respiration, the sense of suffocation, the anxiety and distress, are increased. The patient constantly applies the hand to the throat, which is sometimes painful to the touch; the countenance is bloated; the pulse still remains frequent, hard or small; the cough is short, precipitous, convulsive, ringing, and followed by a crowing, or shrill or hissing inspiration; and at the commencement of this stage is generally dry, or attended by a scanty mucous or sanguineous expectoration; subsequently it becomes husky and suffocative, sometimes with fruitless attempts to excrete what is felt in the trachea. The patient constantly changes his position; breathes with great difficulty, all the respiratory muscles acting with great force; and at each inspiration, the tumid larynx descends rapidly towards the sternum, whilst the epigastrium is drawn upwards and inwards; and, during expiration, the former is carried towards the maxilla, and the latter comes on a plane with the surrounding surface. If any remission at all occur now, it is much less evident. All the symptoms become more severe. The cough is now more difficult, suppressed, or strangulating; the suffocation accompanying it more imminent, and the stridor or hissing noise of inspiration following it much louder: sometimes it is followed by vomiting, and the excretion of a glairy mucus, occasionally containing flocculent or membranous shreds. The pulse is now very frequent, contracted, sharp, and small. The cheeks and lips are, particularly during the cough, somewhat livid, or extremely pale and tumid. There are also great irritability and somnolency, but no delirium. The hissing, sonorous, and croupy character of the inspiration increases; and the voice, which was shrill or hoarse, often becomes broken, whispering, suppressed, or puling.

When vomiting follows the cough, and particularly when the excretion of glairy, albuminous, and membranous matters accompany it, a momentary relief is obtained, sometimes followed by progressive diminution of all the urgent symptoms. Deglutition, particularly of fluids, is sometimes difficult, especially when the larynx is affected, and induces the fits of cough and strangulation. These symptoms seldom continue equally intense during the whole of this stage, but present several slight remissions, particularly at its commencement, and in the less severe cases. Throughout this period, and, indeed, during the whole disease, the bowels are constipated, and the urine in small quantity, of a high colour, and generally albuminous. The *stethoscope* generally furnishes no further information in this stage than a louder sound than that already heard; unless when the disease extends to the large bronchi; when a dry, tubular, or bronchial respiration, unaccompanied with crepitous dilatation of the pulmonary cells, but attended with perfect resonance of the thorax, may be detected.

8. C. The *third stage*, or that of *collapse and threatened suffocation* (the *Suppurative*, of HOSACK and CHEYNE), may commence from the first to the seventh day from the invasion, according to the intensity of the disease, and constitution of the patient. This period is characterised chiefly by the absence of any remission, and the increased severity of all the symptoms, particularly the acceleration and diminished power of the pulse and respiration. The pulse is now small, weak, irregular, unequal, or even intermittent; the cough is less frequent, less audible, suppressed, but suffocative. The voice is whispering, low, or entirely abolished; and the speech quick, imperfect, or lost; the motions of the *ala nasi* and the parietes of the chest are forcible and remarkable, and accompanied with a similar descent and ascent of the larynx and epigastrium to that already described (§ 7.). The head is constantly thrown back; perspiration flows from the forehead; the eyes become sunk, and lose their animation; the countenance often assumes a leaden hue; the tongue is dark and loaded, and its edges and the lips are purplish; the surface of the body is covered with a cold viscid perspiration; the feet and hands swell; the skin is extremely pallid, and shows the veins through it, particularly those of the neck, which are large and distended; and the stools are dark and offensive. The patient very seldom recovers from this state; but he sometimes obtains momentary, much more rarely permanent, relief, owing to the expectoration of a portion of the albuminous, membranous, and muco-puriform matters obstructing the larynx and trachea. When the excretion is free, recovery sometimes takes place slowly; but where it is scanty, or when the disease has extended downwards through the bronchi, as it usually does when thus severe, the issue is commonly fatal. In this case, the patient tosses about in great distress; he seizes on objects around him, and grasps them convulsively for a moment; he throws his head back; seizes his throat as if to remove an obstacle to respiration; makes forcible efforts to expand the lungs; and after a longer or shorter period of such distress, seldom above twenty hours, expires, sometimes with signs of convulsive suffocation, but as frequently with



continued increase of the foregoing symptoms, and evidence of exhaustion of the vital energies, and in a state of lethargy. The *stethoscope* generally furnishes information in this period of the extension of disease to the larger bronchi. This extreme state of disease seldom lasts longer than twenty-four hours. In young children, convulsions sometimes occur, and occasionally terminate life.

9. *D.* Such is the usual course of the *more severe* cases of common and uncomplicated croup, when left to nature, or unmitigated by treatment. In its *slighter grades*, hoarseness, with a hard ringing cough, followed by a crowing or stridulous inspiration, present chiefly in the night and remitting in the day, are almost the only symptoms; the respiration and pulse being but little disordered in the intervals, and the febrile symptoms not very acute. But even these very favourable cases may experience sudden and dangerous aggravations; whilst, on the other hand, the severe and acute disease now described may be soon ameliorated by early and decided treatment at its commencement, or by the discharge of tubular, membranous, or puriform matters, at its more advanced periods.

10. *E.* The *duration* of the disease depends upon the vital energies of the frame, and varies from two to eight or nine days; but I have seen it terminate somewhat earlier, and prolonged much later when partial or scanty expectoration takes place from time to time. A fatal issue is most common on the fourth day. I believe that it very rarely assumes a *chronic* state, preserving at the same time its essential characters; although a somewhat different opinion has been advanced by GOELIS. The cases, however, which he has adduced as instances of the chronic disease, are evidently either the partial removal of the more inflammatory, with recurrence of the more spasmodic, symptoms; or slighter relapses; or the extension of the inflammatory action to the larger bronchi, and its continuance in this seat for a longer period. ALBERS admits that it may become chronic, and supposes that the false membrane may sometimes adhere to the inflamed surface, and be gradually absorbed; recovery at last taking place, without the excretion of the albuminous substances in such cases. These occurrences, although not impossible, are at least very rare. HILDENBRAND supposes, on the other hand, that it may become chronic after the excretion of the albuminous exudation; inflammatory irritation still persisting in a lower grade, and terminating at last in ulceration. This is a much more probable occurrence; and I believe that I have met with it on two or three occasions, but I have never been able to verify it by dissection. In such cases, the disease continues in a slighter grade for several weeks, and is characterised by frequent remissions and exacerbations, or aciation, muco-purulent expectoration, slight soreness in the trachea, and the usual symptoms of tracheal consumption; the patient sometimes sinking at last, or occasionally recovering by judicious means.

11. *ii.* THE MODIFICATIONS OF CROUP. — The forms which the simple or uncomplicated disease assumes are attributable, as already hinted, to the particular part of the air-passages chiefly affected, to the temperament and habit of

body of the patient, and the intensity of the causes.

12. *1st.* *Croup with predominance of the acutely inflammatory symptoms* (the *Acutely Inflammatory Croup* of several modern authors). — This is merely the more acute or severe form of the disease, occurring in robust plethoric children of the sanguine temperament, who have been for some time weaned, and have had their first teeth, and during cold and dry states of the air. It is commonly preceded by chills, and horripilations, and in older children by distinct rigors; and is characterised by the more continued and unremitting severity of the symptoms, by the strength of the pulse, heat of skin, great difficulty and force of respiration, the vascular injection of the cheeks and lips, the highly inflammatory appearances of blood taken from a vein, &c. (*a.*) When the inflammation chiefly, or even partly, *implicates the larynx* (the *Laryngeal Croup* of GUERSENT and others), the strangulation, cough, and all the symptoms connected with respiration, voice, and speech, are extremely severe; pain is felt in the larynx and upper part of the trachea, and there is sometimes slight swelling in this situation. In young children convulsions, and in older children delirium, occasionally occur towards the close. The disease terminates in from twelve hours to five or six days, but most commonly in two or three days. (*b.*) When the inflammation is *confined to the trachea* (the *Tracheal Croup* of several Continental writers), the cough is at first dry, shrill, or sonorous, as if passing through a brass tube, and accompanied with sharp and lacerating pain in the course of the trachea, sometimes with slight tumefaction. The patient speaks in an under tone, but there is little hoarseness, and the voice and speech are not lost, or at least not so much affected as when the disease is seated partly or chiefly in the larynx. Heat of skin, and the usual symptoms of severe inflammatory fever, are also present. As the disease advances, the cough becomes more frequent and severe, but without the distressing sense of suffocation attending the foregoing modification; nevertheless there is still much difficulty of respiration in the intervals between the cough, sometimes with a species of rattle similar to that of bronchitis. The fits of cough are often followed by vomiting, or the rejection of membranous shreds, with a thick, glairy, and sometimes sanguinolent or purulent mucus. The excretion of this substance generally is productive of much relief, which is increased after each discharge, unless the inflammation has extended down the ramifications of the bronchi; and then the respiration continues extremely difficult, and the disease assumes all the characters of an acute bronchitis, and frequently terminates unfavourably. The progress of cases of this description is usually not so rapid, nor the termination so fatal, as of those affecting the larynx chiefly. All the symptoms evince less severity, especially when treated early; and it sometimes continues twelve or fifteen days, but usually from five to nine. When its severity merely is subdued, the inflammatory action not being altogether removed; or when, from accidental causes, or the fault of the constitution, it passes down the bronchi; it may be much more prolonged, and approach the chronic character; but it will then present many of the features of the most severe



bronchitis, into which, indeed, it will thus pass; and, as was stated in respect of that disease, whilst bronchitis may be followed by croup, the latter malady may thus occasion the former.

13. 2d. *Croup with predominance of bronchial symptoms* (the *Cynanche Trachealis Humida* of RUSH; the *Mucous Croup* of some modern authors). — This form is not infrequent in young children of the lymphatic temperament, who are fat and flabby, with a white soft skin. It is often met with soon after the period of weaning, and in those who are brought up without the breast. It commences with coryza, and the other symptoms of catarrh, and often with little fever. After these signs have been present for some time, or sometimes without these being so marked as to attract attention, it generally attacks the child in the evening or during the night, and manifests itself in a decided manner by the sudden occurrence of a hoarse, suffocating, dry, sonorous, or shrill cough, with a sibilous inspiration. The seizure is usually severe, and is attended with manifest alarm to the patient. The countenance is pale, and covered by perspiration, and the lips are violet. Several slighter fits succeed to this first attack; the voice remains hoarse and low, the respiration sibilous and slightly difficult; but a remission usually takes place in the morning, and there is generally but little return of the croupal cough until evening and night, when it recurs, but often in a slighter degree. In some cases, the invasion is more gradual; the remissions but slight, or hardly evident, and the accession of expectoration much earlier; the disease approaching nearer, as respects its seat and character, to acute bronchitis. There is but little fever, the skin is not much warmer than natural, and the powers of life are not remarkably depressed. The throat and pharynx are unaffected. After the first, second, or third day, the cough is no longer dry, its fits become shorter, is sometimes accompanied with a mucous rattle, and begins to terminate in the expectoration of a thick glairy mucus. The disease now assumes many of the features of, or passes into, bronchitis. M. GUERSENT considers that this is merely a false or bastard croup. I believe that it is a milder form of the disease; and that it consists of a slighter degree of the inflammatory irritation of the same parts which are affected in the true croup; but that, in consequence of the much less severity, or some other modification, of the diseased action, and constitution of the patient, glairy mucus merely, instead of an albuminous exudation of a firm consistence, is thrown out; and that, when the features of bronchitis are assumed, the inflammatory action has extended down as far as the small bronchi.

14. 3d. *Of croup with predominance of spasmodic and nervous symptoms* (the *Laryngismus Stridulus* of GOOD; *Spasmodic Croup* of WICHMANN, MICHAËLIS, DOUBLE, &c.; and the *Acute Asthma of Infants* of SIMPSON and MILLAR). This variety of croup has been described by German and French authors, under the name of MILLAR's *Asthma* and has given occasion to much discussion relative to its being a variety of croup; or a distinct disease. Of its being the former, however, there cannot be the least doubt. It occurs chiefly in children who are weak, irritable, subjects of worms, and of the nervous temperament; and comes on most commonly in the night, often

during the patient's first sleep, frequently without well-marked premonitory symptoms, excepting languor, listlessness, headach, fretfulness, and sometimes a short tickling cough; and these may be slight, or of short duration. The child is suddenly awakened by great difficulty of breathing, cough, and general agitation, and continues thus affected for some time; the symptoms gradually subsiding towards morning, or being more quickly relieved by the cough terminating in vomiting. This form of the disease always presents complete remissions during the day, with exacerbations in the evening and night, and thus assumes a regular type; but the remissions often become less complete and of shorter duration, the exacerbations more frequent and prolonged, and the cough, difficulty of respiration, general agitation, and convulsive movements attending them, more severe. There is little or no increase of animal heat or fever, nor actual pain in the larynx and trachea, but a sensation of constriction and uneasiness. The countenance is generally pale in the remissions, and sometimes tumid and livid in the exacerbations, during which the respiration becomes sonorous, laborious, convulsive, and croaking: the extremities are usually cool. The cough continues dry, and accompanied with marked irritability, until the favourable termination of the disease; when slight or moderate glairy expectoration takes place, but without any membranous substances mixed with it. The pulse is very variable; sometimes small, frequent, and constricted; occasionally slow; but generally at last unequal, weak, or intermitting. The urine is paler than in the common and more inflammatory states of the disease, in larger quantity, and sometimes deposits a nebulous sediment. In this variety, the nervous and spasmodic symptoms are present from the commencement; in the former, they appear chiefly in the two last stages; the more common and inflammatory croup sometimes thus passing into the spasmodic.

15. Such are the usual characters of the well-marked spasmodic variety of croup; but cases of so pure and unmixed a form are comparatively rarely met with in practice; as the intermediate shades between the state of disease now described, and either of those preceding, are more commonly observed, at least in this metropolis and vicinity. I have scarcely ever seen a well-defined case unconnected with dentition; or one terminate fatally without the occurrence of convulsions in its advanced stages, or towards its termination; and it has very commonly presented evidence of cerebral congestion. On *dissection* of fatal cases, M. GUERSENT states, that albuminous concretions—sometimes extensive, but more frequently consisting of small isolated patches—are found in the larynx; whilst MILLAR and RUSH detected little or no lesion of the air-passages. In the very few opportunities I have had of examining the state of parts in the more purely spasmodic cases of croup, an adhesive glairy fluid, with patches of vascularity, were observed in the epiglottis and larynx, and a similar fluid was found in the large bronchi. Congestions of the brain, particularly about its base and medulla oblongata, and of the lungs, cavities of the heart and large vessels, were also found; but these were most probably consecutive changes merely.

16. iii. *COMPLICATIONS OF CROUP.*—A. *With*



*Cynanche maligna*. This complication is distinctly alluded to by JOHNSTONE, WITHERING, CULLEN, and several contemporary authors; and is common in the epidemic visitations of this disease, or of anginous scarlatina; the greater number of fatal cases exhibiting soft fragments of false membranes, of a greyish or ash colour, covering the larynx and trachea, and a livid appearance of parts of the subjacent mucous membrane. This is one of the most dangerous complications of the disease. The affection of the air-passages is here consecutive, and the difficulty of swallowing usually precedes the characteristic symptoms of croup, which are generally accompanied with great foetor of the breath.

—*a*. In many instances of the malignant sore throat, the exudation thrown out from the inflamed surface forms a pellicle coextensive with the spread of the inflammatory process from the *fauces* to the pharynx and air-passages. In some cases, ulceration, and slight apparent sloughing, occur in the central parts, and those first affected; whilst the surrounding surface, and parts subsequently diseased, become covered by a soft and easily lacerated exudation. In rare cases the inflammation commences in the *pharynx* (*Cynanche Pharyngea*), and spreads to the *fauces* on the one side, and down the larynx, trachea, and oesophagus on the other. In these, the pellicular exudation formed on the inflamed surface very nearly approaches that of croup; oftener, however, it is of a darker and dirtier colour, softer, and not so continuous: whilst in some cases it is formed in patches, is similar to thin sloughs, and is interrupted in parts by a dark, foul, but not concrete secretion; the subjacent mucous surface being of a dark, livid, or brick-red colour, or ulcerated, or even partially sloughed. Sloughing, however, or even ulceration, although mentioned by several writers, is comparatively rare; the more frequent commencement of the faucial or pharyngeal complication of croup being attended by the pellicular or concreted exudation now mentioned, without sloughing. The above changes are most remarkable in the pharynx, and are slighter in the larynx and trachea; the exudation being there somewhat paler, and from its colour and appearance very generally mistaken, both while adherent to, and whilst being detached from, the inflamed surface, for sphacelated sloughs, particularly as observed in the throat, and described as such. The complication, with croup, of various states of angina or sore throat—malignant, or epidemic—whether commencing in the pharynx, or in the *fauces* and extending to the pharynx, is not uncommon. Epidemic visitations of it have occurred in very modern times, and have been described by HAMILTON, DESLANDES, BOURGEOIS, BRETONNEAU, TROUSSEAU, MORONYAU, EMANGARD, SCHMIDTMANN, and others.—*β*. In some cases the affection originates in the *tonsils* (*Cynanche Tonsillaris*, &c.) and extends to the adjoining parts. In the croup epidemic in Buckinghamshire in 1793, and described by Mr. RUMSEY, the croupal symptoms were stated to have been coeval with “inflammation and swelling of the tonsils, uvula, and velatum pendulum palati; and large films of a white substance were formed on the tonsils.” Similar appearances have likewise been noticed by FERRIAR, HOSACK, MACKENZIE, ROBERTSON, and BOURGEOIS, and by myself; the pellicular exudation extending over the *fauces*, down into the pharynx

and larynx. The croup which has been described by LOUIS, HUFELAND, and others, as occurring in *adults*, was thus complicated. The complication with the malignant sore throat has been observed by me both in its *simple form* and in its *association with scarlet fever*. Some years since I attended, early in the winter, some of the children of a numerous family residing a few miles from town, in a low and damp situation. They had had scarlatina, with very severe sore throat, two or three years previously. On this occasion, one of the oldest was seized with malignant angina, extending to the pharynx, and along the Eustachian tube to the ear, with foetid respiration, and irritation of the larynx, producing a constant tickling cough. A similar affection spread to four of the younger children, and in two of them it was complicated with croup; the symptoms of which were severe, continued, and well marked in one, and more spasmodic and intermittent in the other. In these, ash-coloured exudations covered the greater part of the *fauces* and tonsils, and extended down into the pharynx. They recovered with difficulty, by the means hereafter to be noticed.

17. *B*. Croup may be also complicated with *Thrush*.—Cases of this description are rare. I have seen only two of which I have taken any account. This association has also been observed by JURINE, DOUBLE, PINEL, and ROYER-COLLARD, who notice the adynamic or ataxic character of the fever accompanying it; the adynamic state being the consequence chiefly of this associated disorder supervening upon pre-existing disease, generally of the digestive mucous surface, and often, moreover, in a weak and cachectic system. The patches of pellicular exudation in the mouth and throat, characteristic of thrush, had extended down the pharynx, larynx, and part of the oesophagus, in these cases: death having been occasioned by the consequent irritation, and frequent recurrence of spasm of the larynx. In the only one I had an opportunity of examining after death, there was little or no inflammation in the trachea; but there was considerable vascular injection of the pharynx, epiglottis, and larynx, which were covered by a cream-like exudation, their mucous membrane being softened. The trachea and bronchi contained some flocculent viscid mucus; and the digestive villous surface, particularly in the upper part of the oesophagus, stomach, and portions of the small intestines, was softened and inflamed. In all the foregoing complications, the affection of the larynx and epiglottis is generally more remarkable than that of the trachea.

18. *C*. *With the exanthematous fevers*.—*a*. Croup sometimes comes on during the eruptive fever, or efflorescence of *measles*; when it occasionally assumes more of the remitting and spasmodic character, and is seldom very severe or dangerous. In this case it generally subsides as the eruption becomes abundant. But it also supervenes upon the extinction of the eruption; or it does not appear until during or after desquamation; and, in some instances, not until advanced convalescence. When this occurs, the inflammatory fever soon passes into an adynamic state, and the disease assumes a severe form, with spasms of the larynx, often terminating with convulsions and suffocation. In one instance of this kind that occurred in my practice, much swelling and oedema of the throat appeared ex-



ternally, and aggravated the symptoms; recovery, however, unexpectedly took place, with a free discharge of glairy mucus, and concrete fragments of membrane. In another instance, emphysema of the throat occurred, and gradually extended over the neck, chest, and face. Permission was not obtained to examine the body, so that the channel through which the air had passed from the respiratory passages into the cellular tissue could not be exactly ascertained. — *b.* The complication with *small-pox* has been very particularly noticed by PINEL, ALBERS, VIEUSSEUX, and ROYER-COLLARD, and is not uncommon. It usually occurs in the more severe cases, particularly when the disease is confluent, and generally comes on slowly in the suppurative stage. In the more malignant cases, the difficulty of respiration is excessive; the voice very hoarse or suppressed; the paroxysms of suffocation extreme; the cough dry, or giving issue merely to a small quantity of dirty serum, or muco-sanguineous matter; and the attendant fever adynamic. On dissection, a membranous substance is seldom found in the larynx or trachea, but merely portions of a semi-concrete matter, with spots of intense inflammation in these parts, the epiglottis, and large bronchi. — *c.* The complication with *scarlet fever* is never met with excepting this disease be associated with sore throat, especially when malignant or epidemic (§ 16.). — *d.* The association, or rather the superposition of croup on *erysipelas*, particularly of the head and face, occurring in adults, has been observed by FORESTUS (*Opera*, l. xv. obs. 20.), LATOUR, STEVENSON, and GIBSON (*Trans. of Med.-Chirurg. Soc. of Edin.* vol. ii. p. 95.). In those cases, the inflammation and characteristic exudation spread from the fauces to the air-passage.

19. *D. With other diseases.* — *a.* Croup is sometimes associated with *acute bronchitis*; and when it terminates fatally, it is often in consequence of extension of the inflammation to the *bronchi*, and thence to the substance of the lungs, *pneumonia* thus also supervening. But the croup may also, although much more rarely, be consequent upon *bronchitis*. *b.* It may occur in the course of *pertussis*, and it then usually assumes the remittent and spasmodic, or the bronchial forms. *c.* Lastly, it may be associated with *œsophagitis*; but when this is the case the inflammation with albuminous exudation usually commences in the pharynx, and extends down the *œsophagus*, and to the larynx. This is not an infrequent occurrence in children under two or three years of age; as, indeed, M. GUERSENT has remarked; the larynx and epiglottis being the only parts of the air-passages affected; and these chiefly with spasm, from the irritation of the portions of false membrane covering or coming in contact with them.

20. II. TERMINATIONS and PROGNOSIS. — Croup may terminate — 1st, in recovery; 2d, it may pass into or excite some other disease, — a return to health, or a fatal issue, taking place mediately through it; 3d, in death, either from exhaustion of the vital energies, or from suffocation. *A.* A return to health is indicated by the mild form of the disease; by the quiet respiration whilst the cough is absent; by the moderate excitement and frequency of the pulse; by a looser cough and a more natural state of voice, followed by expectoration of viscid mucus and membranous fragments; by a copious and general perspiration on

the third day, the symptoms being moderate; by epistaxis on the second, third, fourth, or fifth days; by the absence or subsidence of violent attacks of spasm of the glottis, and suffocation; by the simple and uncomplicated state of the disease; and the absence of exhaustion, or of great frequency or irregularity of pulse, and of other signs of adynamia.

21. *B.* It may excite additional disease, or pass into some other malady, — a circumstance which, although not necessarily fatal, may greatly increase the danger. The morbid state of the system, and general depression of vital power accompanying most of the complications now noticed; the more constant affection, and disposition to spasmodic action of the larynx, in all of them; the interruption caused to the respiratory processes, and the attendant or consequent congestion of the lungs, as well as the marked disposition they create to consecutive disturbance; greatly augment their danger generally. The disorders consequent upon the simple and complicated states of croup are both direct and indirect. The direct are — *a.* Extension of inflammatory action to the bronchi and substance of the lungs, — generally an unfavourable event, and indicated chiefly by the unremitting persistence of the symptoms, by deep suffocating paroxysms of cough, great frequency of pulse, lividity or leaden hue of the countenance, by the dark tinge of the lips and tongue, cold clammy perspirations, somnolency, and all the characters of asthenic BRONCHITIS (§ 37.). When the bronchial affection does not appear until during convalescence, it is more slight, unless the causes have been energetic, and it presents more of the usual characters and states of that disease. The consecutive occurrence of either pneumonia or any of the forms of bronchitis should be carefully enquired after, by observing the symptoms, and examining the chest by auscultation. — *b.* Extension of disease to the sub-mucous and follicular structures, occasioning inflammation and ulceration of these tissues, with symptoms of laryngeal or tracheal consumption upon the subsidence of croup, is a much more rare occurrence than the preceding; but, when it takes place, a mucopuriform expectoration accompanies and follows the characteristic discharge and signs of croup, with pain and irritation in the larynx and trachea, recurring exacerbations of suffocating cough, and difficulty of breathing, chiefly of a spasmodic description, particularly when the inflammatory irritation is seated in the larynx or epiglottis, and the usual symptoms of hectic. The very marked tendency, also, of the disease to *relapse*, is in a great measure owing to the persistence of a slight degree of inflammatory action in the large bronchi, or in the trachea and larynx, for some time after the membranous exudation on the diseased surface has been thrown off; the disorder being readily aggravated upon exposure to the exciting causes. This disposition of the disease to return diminishes with the length of time that has elapsed from the subsidence of the original attack, but does not altogether disappear for many weeks, or even for months, especially in some constitutions, and in the last and first months of the year; and even more than one relapse may take place in weak, irritable, and nervous frames, but generally in a more spasmodic



form. — *c.* Besides producing these, it may occasion, although very rarely, abscess in the vicinity of the larynx or trachea. I believe that dilatation of the bronchi is a much more frequent result. — *d.* Of the more indirect terminations and consequences of this disease, congestions of the encephalon, giving rise to *convulsions* and effusion of serum in the ventricles, or between the membranes, are the most important. In many cases, particularly in delicate and nervous children, the convulsive movements seem to commence with the spasmodic actions of the laryngeal muscles, and the strangulation thereby occasioned; the head and neck being thrown back, and all the limbs convulsed. Life is in some cases thus terminated by asphyxy. JURINE, VIEUSSEUX, and myself, have met with cases of *hydrocephalus* following the disease; but they are not common.

22. *C. Danger* is to be dreaded, when fever is very high early in the disease, and when respiration is permanently audible, cooing, and laborious, or as described above (§ 7.). When the disease goes on to the third stage, notwithstanding the treatment; when it presents any of the complications (§ 16.) and consecutive affections (§ 21.) already noticed; when the discharge of the characteristic exudation does not take place, or when the expectoration of fragments of it is not followed by any relief; when the countenance becomes livid or leaden, the eyes sunk, the lips and tongue dark, and the pulse very frequent, small, weak, and irregular; and the other symptoms of vital exhaustion appear; *great danger* exists. A *fatal issue* is to be expected when the patient presents the appearances described as characterising the third stage, particularly those noticed as marking its close (§ 8.).

23. III. DIAGNOSIS. — The hoarseness, and the loud, sonorous, and ringing cough; the forcible and difficult inspirations; flushed face; injected and watery eyes; the frequent and hard pulse, with thirst and inflammatory fever, the heaving of the thorax and motion of the trachea, in the developed stage; and the husky choking cough, the whispering voice, and wheezing respiration, &c. of the third stage; sufficiently distinguish this disease from any other. When it is uncomplicated, nothing beyond a slight redness is ever observed in the throat; and there is little or no pain upon deglutition, unless the larynx be much affected.

— *a.* Croup can scarcely ever be mistaken for *Cynanche maligna*, or *C. Pharyngea*, or any other form of sore throat, as long as these affections do not extend to the larynx; as the great difficulty of deglutition, and the but little disturbed state of respiration, independently of the obvious affection of the throat, &c., are sufficient to distinguish between them. When, however, portions of the concreted exudations in these affections irritate the glottis, they occasion a short, tickling, dry cough; and even excite, in some cases, strangulating spasms of the larynx, nearly resembling croup, particularly when it is complicated with these maladies. If, however, it be thus associated, the croupal characters, in addition to the appearances in the throat and pharynx, will be too evident to be misunderstood; the descriptions already given of these complications being sufficient to point them out. — *b.* During the eruptive fever of *measles*, the tracheal affection is often so great as to simulate croup; and in many cases it even

amounts, as already stated, to a slighter form of the complaint, which usually disappears as the eruption becomes matured: but attention to the symptoms will readily show the nature of the disorder, and how far the affection of the larynx and trachea should be viewed as a symptom, or as an important complication of the exanthematous disease. — *c.* Croup may readily be distinguished from *bronchitis*, by its sudden and severe attack; its occurrence in the evening and at night; its remissions; the hoarseness, and the ringing, dry, and frequent cough; the difficult inspirations, and impeded respiration; the altered voice and speech; the sensations and symptoms referrible to the trachea in the former, and to the sternum and chest in the latter; and by the absence of expectoration until late in the disease, when it is membranous or tubular, and not mucous and muco-puriform as in *bronchitis*, until after the discharge of the membranous exudations. These characters will also serve to indicate the supervention of croup on *bronchitis*, — an occurrence which is sometimes observed, although much more rarely than that of *bronchitis* on croup. — *d.* *Laryngitis* is with greater difficulty distinguished from croup than the foregoing, and in many respects there is little or no difference. The practical importance of the diagnosis may not appear great, but it is sufficiently so to warrant an accurate distinction. 1st. True *laryngitis* occurs in adults; seldom, in children, in any other form than associated with either the simple or complicated states of croup. 2d. It is a purely inflammatory disease, attended by a fixed burning pain in the larynx, increased on pressure and examination; and, when attacking adults, never gives rise to a false membrane, unless it be superinduced in the specific and epidemic forms of *cynanche*, and then it assumes modified characters. 3d. It more frequently terminates in the manner characterising acute inflammations, viz. ulceration and suppuration, than when the larynx is affected in croup. 4th. It is more acutely and constantly inflammatory, the symptoms are more continued, and it is more benefited by a purely antiphlogistic treatment, than croup. 5th. It much oftener passes into the chronic form, than the latter disease. (See LARYNX — *Inflammations of*.) — *e.* *Chronic laryngeal and tracheal inflammation* — the laryngeal and tracheal consumption of some writers — resemble croup, in the hoarse voice, harsh dry cough, and the difficulty of respiration; but their progress is much slower, and less acute, than croup; they do not present the violent paroxysms towards night; they seldom or never are observed in children; and ulceration of these parts of the air-passages is always found in fatal cases. — *f.* Croup may also be confounded with the diffusive inflammation which sometimes attacks, either primarily or consecutively, the cellular tissue about the throat, or with abscesses in the same situation; either of which may involve the larynx and membranous part of the trachea, or so affect them as to give rise to croupal symptoms; but the external appearances, the difficult deglutition, the state of the throat, and the history of the case, will at once show the differences existing between them. — *g.* *Pertussis* and croup can hardly be mistaken for each other; the invasion, characters, and progress of both diseases being so very



different. The prolonged whoop, the unchanged voice, and the occurrence of the cough in convulsive paroxysms after a meal, terminating in vomiting and a copious discharge of a clear and glairy fluid; the complete intermissions, respiration, voice and speech remaining unaffected; the almost entire absence of fever, and the much more slight and chronic form, of the latter disease in its uncomplicated state; are sufficient distinctions. Croup may, however, occur in the course of hooping cough; but then its characteristic symptoms will make it apparent to the attentive observer, and point out the nature of the resulting association. — *h.* The effects following *substances that have escaped into the trachea* often resemble croup; but may be distinguished from it by the sudden occurrence of pain and suffocation; by the frequent change of the exact seat of uneasiness with the change of the situation of the foreign body; the dryness of the cough, and the violence of the strangulation; and by the irregularity, the completeness, and sometimes the long continuance, of the intermissions. When a foreign substance passes into the glottis, and is retained there, suffocation is generally occasioned either from the size of the substance, or from the spasmodic constriction of the muscles of the larynx occasioned by it. — *i.* *Hysteria* may also simulate croup; but the age of the patient, the history of the case, and the local and general symptoms, if attentively observed, will indicate the nature of the affection. — *k.* The spasmodic states of croup closely approach to *convulsive spasm of the larynx*; but the absence of cough and fever, the brief fits of strangulation, the complete intermissions, the spasm of the thumbs and toes, the purplish countenance, and the general convulsions, will distinguish that affection from any form of croup. (See LARYNX — *Convulsive Spasm of.*)

24. IV. CAUSES. — *A. a.* Croup is more frequent in cold and moist climates than in those which are warm. Rapid and frequent vicissitudes of season, weather, and temperature, have considerable influence in producing it. Hence its prevalence in the valleys of Switzerland and Savoy; in this country, particularly on its eastern side; in the other north-west countries of Europe; and in North America. But the middle, and even the south of Europe, are not exempt from it. M. VALENTIN has shown its frequency in the middle and southern provinces of France, GOELIS in Vienna, and GHISI in the north of Italy. Sir JAMES M'GRIGOR notices its prevalence — probably in a complicated form, from its occurrence also in adults (§ 25.) — at Bombay, in 1800. According to the information given by JURINE, LENTIN, CHEYNE, and others, we might be led to infer that it has been more common in very modern times than formerly: the difference may, however, be owing to its having been mistaken for some other affection. I believe that it has not been so frequently met with during the preceding five years, as it was about twenty or thirty years ago. M. JURINE remarks, that, although the table he has given of the number of cases from 1760 to 1807, shows a nearly progressive increase, yet he has observed, at Geneva, no increase during the last eighteen years preceding the date of his work. The following evidence, nevertheless, would render it evident that, in some countries at least,

croup is more prevalent now than formerly. According to the information given by Dr. COOKSON, a practitioner of forty years' experience in Lancaster had never seen it until 1760. Dr. FRIEDLANDER (*Journ. de Montpellier*, No. IX. p. 276.), states, that it has become yearly more prevalent in Vienna; and that the physician to the Hospital for Children, who had treated, from 1774 to 1817, nearly 60,000 children, did not meet with a single case in the three first years of his practice, saw it but rarely during the next six years, and yet treated 1665 cases of it in the last five years of this period. Similar facts are also furnished by Dr. GOELIS. Although croup occurs at all seasons of the year, it is most prevalent in those which are cold and moist, or when the alternations of temperature are sudden and remarkable. I have observed it more frequently in the months of January, February, March, April, November, and December, especially if east or north-east winds prevail after heavy or continued falls of rain. I believe that the above results are nearly in accordance with those furnished by JURINE, CRAWFORD, MICHAËLIS, DOUBLE, and BRICHETEAU.

25. *b.* The great susceptibility of *early age*, and the narrowness of the larynx previously to puberty, have generally been supposed to favour the occurrence of croup. M. BLAUD, however, denies that this latter circumstance has any influence in causing it. This is doubtless the case in respect of the *production* of the disease, but not as regards its *severity* and *danger*, both of which it evidently increases. It is rare to meet with croup until after the child has been weaned: I have, however, seen it in children at the breast, as early as three, four, five, and six months of age; but much more frequently at this age in those who have been brought up by hand; and in a still greater number of instances, at from seven months to upwards of a twelvemonth, in those which have been recently weaned. M. DUGES states, that he met with an instance of it in an infant of a few days old. The age at which the disease is most common is, according to my experience, from one year to nine. But it not infrequently occurs at both an earlier and a later period. VAN BERGEN states, that it is often observed from the age of two to five years inclusive: HOME assigns from fifteen months to twelve years: CRAWFORD mentions some cases from fifteen months to two years, but gives the age of from two to eight as the most common: CHEYNE, from sixteen months to twelve years; SALOMON, from two to five years inclusive; MICHAËLIS, from fifteen months to ten years: ZOBEL, from the latter months of suckling to nine years; VIEUSSEUX, from seven months to ten years: BERNARD, from one to six years; BARTHEZ, from two to ten; RUMSEY, till fourteen; and CAILLAU, from eighteen months to eleven years. The foregoing applies only to the simple and uncomplicated disease. When it occurs in a complicated form, or consecutively upon anginous affections, particularly upon inflammation of the pharynx, tonsils, or fauces, or on the exanthematous diseases, it may, and, indeed, occasionally does, occur in adult subjects, and in infants of a more tender age. The cases published by M. LOUIS, and denominated by him croup in the *adult*, were instances of the anginous complication. Although the occurrence of uncomplicated croup in adults is very



rare, cases have been observed by HOSACK, MITCHELL, MILLS, and LATOUR.

26. *c.* M. BLAUD and Dr. ALBERS observe, that *boys* more frequently contract the disease than *girls*, owing to the greater exposure of the former to its exciting causes. This opinion has been opposed by MM. DOUBLE and ROYER-COLLARD; whilst Dr. JURINE states, that of ninety-one cases he treated up to 1808, fifty-four were boys, and thirty-seven girls; and of twenty-eight cases which occurred in 1808, eighteen were boys, and ten girls. According to his observation, also, the greater number of cases occurred at the age of two, three, and four years; and next at one, five, and seven. This accords with my own experience, which is further supported by that of GOELIS, who, from 1797 to 1808, treated 252 cases of the disease, of which number 144 were boys, and 108 girls.

27. *d.* The nervous and sanguine temperaments, or a mixture of the two—the spasmodic characters predominating in the former, the inflammatory in the latter—with a tendency to a fulness of habit, seem to predispose to croup. That it will, however, often come on independently of plethora, cannot be disputed. I have seen it in infants of about four months old, brought up by hand; and even in these, soon after having lost much blood in the treatment of other diseases, especially when cold easterly winds occur in the spring or autumn, after heavy falls of rain. CHEYNE, and some others, conceive that an hereditary tendency exists in croup. But this is not made out: for, as M. DESRUELLES has judiciously remarked, the only proof that can be brought in support of it, is the circumstance of two or more children being seized with it in the same family; an occurrence which may be explained by the susceptibility of age and temperament, being often necessarily the same in several of them; and by their being exposed to the same agents, and placed under similar circumstances.

28. *e.* The localities in which this disease seems most prevalent are those which are low and moist, near the sea, on the banks of large rivers or lakes, or near marshes, in the depths of low valleys, or at the bases of precipitous mountains. Hence the endemic character, which some writers have imposed on it, but which is not strictly applicable; for, although it is more frequently observed in the above situations, yet it is also often met with in places very oppositely circumstanced; and it cannot, therefore, strictly be said to be an *endemic* disease.

29. *f.* The *epidemic* prevalence of croup has been contended for, and denied, by writers. Some consider it as entirely sporadic and accidental; others suppose that it may become epidemic consecutively upon catarrhal epidemics, and that it has no other claims to such a character; whilst many believe that it occasionally appears in an epidemic form. That it has so occurred in former times appears evident. BAILLOU manifestly observed it in an epidemic form, in Paris, in 1576; GHISI, at Cremona, in 1747; STARR, in Cornwall, in 1748; ROSENSTEIN, in Upsal, &c., in 1762; VAN BERGEN, in Frankfort, in 1764; WALHBOM and BAECK, in some parts of Sweden, in 1768 and 1772; BARKER and MOST, in some places in the United States; AUTENREITH, at Stutgardt, in 1807; ALBERS and others, in parts of Saxony, in 1807 and 1808; SCHMIDT-

MANN, in 1811; and various other writers during the last fifty years. My own observation would lead me to infer, that, although croup is generally a sporadic disease, occurring occasionally at all seasons, yet it sometimes assumes epidemic features, both in respect of its simple state, and its complications with other species of angina, particularly at periods when they or catarrhal affections prevail—the seasons favourable to the production of these diseases most frequently occasioning this malady also. This opinion derives support from the numerous facts furnished by RUMSEY, PINEL, JURINE, GOELIS, ALBERS, ROYER-COLLARD, BRICHETEAU, BRETONNEAU, and other writers referred to at the end of this article.

30. *g.* Several authors, particularly WICHMANN, BOEHMER, FIELD, ROSEN, GOELIS, LOBSTEIN, GUERSENT, LOUIS, SHULTZ, and G. GREGORY, have adduced facts to show that the disease may occasionally prove *infectious*. The two early Swedish writers contemporary with HOME, namely, HALEN and WAHLBOM, assert its infectious nature. On the other hand, this property is denied by CHALMERS, MICHAËLIS, THILENIUS, DOUBLE, and ALBERS. It has most indubitably manifested this property when it has prevailed epidemically, and when associated with cynanche maligna, and some other exanthematous or anginous affections. On several occasions, however, of its occurrence within a short time, in two or more members of the same family, it has evidently proceeded from the same causes acting upon similar states of susceptibility and disposition. But even the simple form of the disease has appeared in children who have slept in the same bed with another affected by it. Two or three such cases have occurred under my own observation; and others are recorded by GOELIS, and some other authors now mentioned. Whether or not it was produced in these cases by inhaling the air respired by the affected child, or by the causes above stated, may be disputed. Yet it is probable that the air which has been respired by the affected may sometimes be a concurrent or determining cause of it in others.

31. *B.* Although the foregoing may be considered as *predisposing* causes merely, yet they are very commonly the only *exciting* causes which can be detected. There is no doubt, however, that the causes which occasion common catarrh and bronchitis sometimes also give rise to croup. It is also not infrequently excited by, or at least consecutive of, bronchitis, whooping cough, the various forms of cynanche, measles, erysipelas, and scarlet fever; and it occasionally also appears during advanced convalescence from these, especially the latter; and, indeed, from other acute diseases. Also running against the wind, crying, and exertions of the voice; cold acting in any manner, or upon any part of the body, particularly upon the neck and throat; having the hair cut short during cold or windy weather; habitual exposure, and the laying aside the accustomed covering of the neck and chest; and even accidental attempts at swallowing substances of an acrid nature, or of a very high temperature; have sometimes produced croup. The retrocession of the above eruptive diseases, and the suppression of other eruptions, or of discharges, secretions, and excretions, are amongst its most frequent causes.

32. *V. PATHOLOGY OF CROUP.*—*i.* *Lesions observed in fatal cases.* A precise idea of the



organic changes which take place in the course of the disease is necessary to enable us to devise, at the commencement, appropriate means, both for their prevention, and for their removal when prevention is unattainable. The lesions observed in fatal cases, and present in all, to a greater or less extent, may be referred to two heads.—

1st. Inflammation with tumefaction, redness, injection of the blood-vessels, and slight softening of the mucous membrane of the air-passages. 2d. An albuminous exudation in the form of a false membrane, or a thick, glutinous, and stringy mucus, or both. (See BRONCHI AND AIR-PASSAGES—*Lesions of*, § 12.) A. The former of these is usually observed, varying, however, in respect both of intensity, and extent of surface affected. In some cases, they are limited to the upper part of the trachea; in others, they extend to the larynx, or to both the larynx and first divisions of the bronchi, or to the latter merely; and, in complicated cases particularly, or when the disease assumes a seemingly epidemic, or even infectious character, the inflammatory states now enumerated, with the characteristic secretion, exist also in the pharynx and fauces, and advance downwards to the ramifications of the bronchi. In the most acute forms of the disease, the mucous surface of the trachea and larynx assumes the above inflammatory appearances in the course of a few hours. In the second stage of the disease, it becomes streaked or partially covered by an albuminous, and sometimes a sanguinolent exudation; and in the last stage, this exudation has concreted to a more or less complete membrane; the inflammatory states of the surface underneath still remaining, but in a less distinct manner, and occasionally in patches or streaks only. In some cases, the injection of the vessels, and tumefaction of the surface, are but slight, yet the exudation of a thick concrete membrane exists to a considerable extent; in others, it is thin and scanty, or almost entirely consists of a thick tenacious mucus.

33. B. The morbid exudation varies much in consistence, in quantity, and the extent of surface covered by it. In some complicated or consecutive cases, already alluded to, a false membrane has formed from the fauces to the last ramifications of the bronchi. MM. BRETONNEAU and BRICHETEAU have observed it without any breach of continuity throughout the whole of this extent. I have never met with an instance where it was so extensive, without interruptions, particularly in the bronchi and about the larynx. In the greater number of the pure uncomplicated cases of the disease, the concretion exists principally in the upper part of the trachea. In the more acutely inflammatory, it extends to the larynx and epiglottis; in others, to the first ramifications of the bronchi; and in a few, in both directions. In the complicated cases, and in those of an apparently epidemic and infectious nature, the throat is equally affected, constituting the *Diphtherite*, or the *Inflammation pelliculaire* of M. BRETONNEAU. This false membrane is whitish, greyish white, or passing to a greyish yellow. Its thickness varies considerably. MICHAËLIS and BARD consider a line and half, or two lines, to be its utmost thickness. I have certainly seen portions quite as thick, but not thicker, and sometimes evidently consisting of

two or more distinct layers. It is thickest in the posterior and superior part of the trachea, and thinnest about the larynx and epiglottis, when it extends thither, and in the lowest and anterior part of the trachea. Its consistence and tenacity also vary extremely, not only in different, but also in the same case. It is almost universally softest where it approaches the bronchi, where it generally passes into a thick glutinous mucus. The more consistent and firm it is, the more perfectly is it moulded upon the surface from which it was secreted. But when the consistence is slight, it forms merely membranous shreds, or soft polypous concretions, intermingled with a thick glutinous mucus. The interior of those exudations is generally covered with a whitish tenacious mucus; and their exterior, or the surface which has been in contact with the inflamed mucous membrane, is sometimes dotted with minute specks of blood. In some cases, these concretions are found still adhering to the surface on which they are formed; in others, they are either partially or altogether detached from it by a puriform mucus.

34. The state of the exudation varies with the stage of the disease, the intensity of the inflammation, and the treatment which has been adopted. Thus, when a child dies very early in the malady, instead of the albuminous coating above described, a tenacious, or reddish, frothy mucus is only found. In this comparatively rare case, the spasm of the air-passages attending the inflammation, together with the obstruction occasioned by this mucus, has produced asphyxia. It seems that this glutinous exudation becomes more condensed, and moulded into a false membrane, or partially assumes this state, as the disease advances. (See BRONCHI AND AIR-PASSAGES.)

35. C. In many cases, instead of a membranous exudation, a viscous, muco-puriform matter lines the trachea only, or both the trachea and larynx, as remarked by FRANK, VIEUSSEUX, VALENTIN, DOUBLE, DESRUELLES, BRICHETEAU, BLAUD, and ODIER. This substance is whitish, greyish, or yellowish grey, and occasionally flocculent. It is not infrequently formed in considerable quantity in the more acutely inflammatory cases (§ 12.), and particularly in those which terminate fatally in some hours. It seems as if the quantity of thick viscous matter thrown out on the inflamed surface, together with the spasm of the trachea and larynx, occasioned suffocation before it could be condensed into a membranous substance. Cases of this description have been particularly noticed by M. ROYER-COLLARD, and have occasionally come before me in practice. I have sometimes also observed a thick, stringy, and adhesive matter, of a greyish white colour, in the superior and posterior part of the trachea and larynx, obstructing the passage, the mucous membrane underneath being nearly altogether exempt from redness and tumefaction. In some instances, this matter has presented a muco-puriform character, varying in its shade of colour, but extremely thick and adhesive. A similar appearance has been remarked by DESRUELLES, DOUBLE, BLAUD, and BRICHETEAU. Owing to the absence of the usual marks of inflammation in the situation where this accumulation has been met with, it may be presumed that the inflammatory marks had partly dis-



appeared after the discharge of this matter; its secretion promoting the resolution of the inflammatory action, the remaining signs of which had vanished after death; the accumulated secretion which had been instrumental in occasioning dissolution alone presenting itself, the powers of life having been insufficient for its excretion. I have suspected, from observing the progress of other cases, that the inflammatory action sometimes had commenced in the bronchi, extended upwards along the trachea, and that the secretion now noticed had been chiefly furnished from the larger bronchial ramifications, and had become so thick and adhesive when it arrived at the upper part of the trachea and larynx, as not to have been expelled by the cough, but to have excited spasm of the glottis, and thereby produced suffocation. In some instances of this description, more decidedly inflammatory appearances were observed in the larger bronchi than in the trachea. It is probable in these, that the secretion found in the latter situation proceeded chiefly from the former, and that the injection of the vessels in the mucous lining of the trachea had disappeared after death.

36. *D.* Any very remarkable lesion of the tissues subjacent to the mucous surface has not been found, unless the disease has terminated in tracheal consumption. It has been a question whether or not the false membrane formed in croup is capable of becoming organised, and united to the surface that has produced it. We have no conclusive evidence of such an occurrence, although SOE MERRING, ALBERS, and BRICHETEAU are inclined to believe it possible. The other morbid appearances are chiefly the consequences of the interrupted functions of respiration and circulation through the lungs; such as congestion of this organ and of the brain; hepatisation of parts of the lung; emphysema of this viscus; and, in very young children, enlargement of the thymus gland. The lesions observed in the complications of the disease, as far as they have not been already noticed, more strictly belong to the particular maladies with which it is occasionally thus associated; where they are described, and in the article MEMBRANE.

37. *ii. Nature of the Disease.*—Different opinions have been entertained as to its inflammatory nature in all cases, the exact character of the inflammation, and the extent to which spasm of the upper parts of the air-passages may contribute to its production. The very slight inflammatory signs sometimes found in the part covered by the false membrane; the absence of these, as well as of any fluid or concrete exudation, in other cases; the circumstances under which the disease has sometimes made its appearance, and the absence of phlogistic symptoms in its course, an albuminous exudation either forming notwithstanding, or not at all; have induced several writers to consider it as not merely an inflammation of the upper part of the air-passage, but a disease of a peculiar nature, more or less connected with the state of the system, although principally affecting the trachea, and frequently the larynx and large bronchi also. The opinions of ROGERY, HARLES, HECKER, and many others, amount to this merely; and they seem not far from the truth. I have remarked, that, although croup assumes the more unequivo-

cally inflammatory form in strong and plethoric children, it does not most frequently affect them, unless they be of the sanguine or irritable temperament; that it presents every shade or modification from this, to the least phlogistic, and most manifestly spasmodic, form; that even its most inflammatory state may assume a spasmodic or nervous character after large depletions, which, while they diminish, as under every other circumstance of disease, the phlogistic diathesis and symptoms, even the nervous and spasmodic; and that, even when the first seizure has been of the inflammatory form, yet the relapses, or subsequent attacks, which are sometimes repeated several times at irregular intervals, have generally possessed more of the spasmodic character.

38. Another fact, which I have uniformly observed, appears important, namely, that the quantity of fibrine and crassamentum in the blood taken from the patient, and of albumen in the urine, have been great in proportion to the inflammatory type of the disease, and the disposition to form a false membrane; whilst in the more spasmodic varieties, in which an albuminous exudation is seldom found, or at least but sparingly, and the urine is more copious and limpid, and less, or not at all, albuminous, the blood has presented a smaller or less firm crassamentum. These facts evidently show, not only that the state of the blood is different in these forms of the disease, but that the condition of the organic nervous or vital power, upon which the appearances and constitution of the circulating fluid so closely depend, is also different; and, moreover, that the manifestations of both the one and the other will vary in the different modifications of croup, conformably with these results. The combined and reciprocative operation of the nervous influence, and the condition of the circulating fluid, will give rise, according to the state of the frame, and the nature and combination of the exciting causes, to constitutional as well as local phenomena; to a state of febrile action, which will be inflammatory in, generally, the majority of cases, nervous in others, and present more or less of gastric or even of adynamic symptoms in some, particularly when the disease occurs in a complicated or epidemic form. The importance of attending, during the treatment of particular cases, and of their different stages, to the characters of the constitutional disturbance—to the attendant fever, will be evident, as indicating not only the means to be adopted, but also the nature of the local mischief. Thus, in the cases attended by inflammatory fever, the exudation is abundant and rapidly formed; in that manifesting the nervous form, it is either scanty, imperfect, or consists of a little glairy fluid,—the spasmodic character predominating, and cerebral symptoms sometimes supervening; and in that presenting the adynamic and gastric form, it is spreading,—being seldom limited to the trachea and larynx, but often extending to the pharynx, fauces, the mouth, and even to the nostrils on the one hand, and down the œsophagus and bronchi on the other. It is in this last form that the disease presents itself when it is epidemic or infectious; and although the adynamic (or the malignant character, according to J. P. FRANK) often manifests itself early, yet the antecedent febrile symptoms very evidently evince high action.



39. There is one important point not sufficiently adverted to by authors, viz. the very early period at which the tracheal exudation is often poured out, in the inflammatory states of the disease; the symptoms marking the first or premonitory period being those indicating the local development of the malady. Thus, a healthy child has evinced no disorder for several days, or the disorder has been so slight as to escape observation — it may even be more than usually lively and alert on the day preceding the night on which it is most severely attacked; and yet, if an emetic be that instant exhibited, a large quantity of thick, glairy, sanguineous, and gelatinous matter will be brought away from the air-passages; showing that, in many instances, the early advances of the inflammatory action is slow and insidious; that the characteristic seizure often does not occur until the exudation has accumulated to a considerable extent in the trachea, or the inflammation has extended to the larynx; and that it is partly owing to the retention of this matter, — which is evidently thrown out in a fluid form, — that it concretes into a false membrane, each successive discharge sometimes forming a distinct layer. MM. GENDRIN, ANDRAL, and other pathologists, have remarked, that the inflammatory action which gives rise to the albuminous exudation on the surface of mucous membranes is of a sub-acute, rather than of an acute kind. I believe that this is the case in respect of the inflammation of the trachea and larynx, in croup; and that the formation of a false membrane is the result not so much of the sthenic or acute character of the local action, as of the abundance of albumen and fibrine in the blood, — a circumstance which partly accounts for the frequency of relapses in some children (§ 41. o.), and justifies HARLES, HECKER, and others, in considering the disease to consist of a peculiar form of inflammation. Some writers, however, suppose that the very acute symptoms, and rapid termination of many cases, militate against these opinions; but it should be recollected that, even in the most severe cases, the inflammatory action, when it commences in the trachea, often exists for several days, in the manner already noticed, until it has either extended to the larynx, or produced such a quantity of albuminous exudation as will obstruct respiration, or induce, by its irritation, spasm of the air-passages, — these effects being the chief causes of the severity and rapid termination of the disease. This will become more evident, when we consider the consequences of interrupted respiration upon the frame — whether the interruption proceed from the mechanical obstruction occasioned by the exudation and false membrane, or the frequent recurrence or continuance of spasm of the larynx and trachea; or from inflammatory action, and its consecutive exudation extending down the bronchi; or from two or all of these combined. These consequences are, in fact, the third stage of the disease; the symptoms of which are the usual phenomena resulting from obstructed respiration, interrupted circulation, and congestion of the lungs; imperfect action of the air upon the blood, and the circulation of this fluid in a nearly venous state, with congestion of the cavities of the heart, and impeded return of blood from the head. The circulation, moreover, of imperfectly arterialised blood to the nervous systems occasions lethargy,

with sinking of the vital powers, and increases the disposition to spasmodic action of involuntary parts, and to convulsive movements of voluntary organs; all which (the former especially) become so prominent a character of the malady in its advanced stages, and often terminate existence. Thus it will appear manifest, — and the fact is of great practical importance, — that the severity, rapidity, and danger of croup, are not the immediate consequences of the activity or acuteness of the inflammatory action; but of the exudation to which it gives rise, and of the conformation and functions of the parts which it affects.

40. DUVAL, JURINE, ALBERS, and SCHMIDT, have considered it worth ascertaining, in how far the disease could be *artificially produced* in the lower animals; and whether or not, when thus produced, inflammation exists to the extent of accounting for the phenomena, or gives rise to a false membrane. They injected into the trachea of fowls, dogs, cats, sheep, wolves, &c. various irritating substances, as the bichloride or peroxide of mercury (SCHMIDT) dissolved in spirits of turpentine, and solutions of iodine, and nitrate of silver; they moreover made these animals inhale the fumes of sulphuric and muriatic acids; and the results were just what might have been anticipated, viz. that in some cases, inflammation without any exudation was produced; in others, a fluid, or more or less concrete exudation was found in various quantity; and in all, the matter in the air-passages was not sufficient entirely to obstruct the access of air to the lungs; thus confirming the opinion justly contended for by CULLEN and others, that a great part of the phenomena and consequences of the disease is to be attributed to spasm of the larynx and trachea. SCHMIDT succeeded in producing a false membrane only in young animals, — a fact in accordance with the spontaneous occurrence of the disease previously to puberty, and to be referred to the more albuminous state of the blood often observed at this period. It may be of importance to know that croup — identical in its phenomena and organic changes with the disease in the human subject — occurs also in several of the lower animals, especially before they are fully grown. Its occurrence in chickens is well known by the name of "*Pip*." DUPUY, RUSH, VALENTIN, YOUNG, and others, have observed it in horses and dogs; DOUBLE, in lambs and cats; and GHISI and GOHIER, in cows. In some of these animals it has even occurred as an epidemic.

41. *Pathological Conclusions.* — Another point, of greater importance than it may at first seem, is whether or not the matter concreted and moulded on the inflamed mucous surface be exuded by this tissue itself, or secreted by the follicular glands with which it is so abundantly supplied. M. GRIMAUD has adopted the latter alternative. From particular attention I have paid to this subject, some of the results of which have been stated in the article BRONCHI (§ 11, 12.), I would draw the following inferences relative to it, and to the pathology of croup generally: — (a) That the mucous membrane itself is the seat of the inflammation of croup; and that its vessels exude the albuminous or characteristic discharge, which, from its plasticity, and the effects of temperature and the continued passage of air over it, becomes concreted into a false membrane; — (b) That the occasional appearance of blood-vessels in it arises



from the presence of red globules in the fluid when first exuded from the inflamed vessels, as may be ascertained by the exhibition, upon the approach of the symptoms, of a powerful emetic, which will bring away this fluid before it has concreted into a membrane; these globules generally attracting each other, and appearing like blood-vessels, as the albuminous matter coagulates on the inflamed surface;—(c) That the membranous substance is detached in the advanced stages of the disease, by the secretion, from the excited mucous follicles, of a more fluid and a less coagulable matter, which is poured out between it and the mucous coat; and, as this secretion of the mucous cryptæ becomes more and more copious, the albuminous membrane is the more fully separated, and ultimately excreted if the vital powers of the respiratory organ and of the system be sufficient to accomplish it;—(d) That sub-acute or slight inflammatory action may be inferred as having existed, in connection with an increased proportion of fibro-albuminous matter in the blood, whenever we find the croupal productions in the air-passages; but that these are not the only morbid conditions constituting the disease;—(e) That, in conjunction with the foregoing,—sometimes only with the former of these in a slight degree,—there is always present, chiefly in the developed and advanced stages, much spasmodic action of the muscles of the larynx, and of the transverse fibres of the membranous part of the trachea, which, whilst it tends to loosen the attachment of the false membrane, diminishes, or momentarily shuts, the canal (of the larynx) through which the air presses into the lungs;—(f) That inflammatory action may exist in the trachea, and the exudation of albuminous matter may be going on, for a considerable time before they are suspected,—the accession of the spasmodic symptoms being often the first intimation of the disease; and these, with the effects of the pre-existing inflammation, give rise to the phenomena characterising the sudden seizure;—(g) That the modifications of croup may be referred to the varying degree and activity of the inflammatory action; the quantity, the fluidity, or plasticity of the exuded matter; the severity of spasmodic action; and to the predominance of either of these over the others in particular cases, owing to the habit of body, temperament, and treatment of the patient, &c.;—(h) That the muco-purulent secretion, which often accompanies or follows the detachment and discharge of the concrete or membranous matters, is the product of the consecutively excited, and slightly inflamed, state of the mucous follicles, the secretion of which acts so beneficially in detaching the false membrane;—(i) That a fatal issue is not caused merely by the quantity of the croupal productions accumulated in the larynx and trachea; but by the spasm, and the necessary results of interrupted respiration, and circulation through the lungs;—(k) That the partial detachment of fragments of membrane, particularly when they become entangled in the larynx, may excite severe, dangerous, or even fatal spasm of this part, according to its intensity relatively to the vital powers of the patient; and that this occurrence is most to be apprehended in the complicated states of the malady, where the inflammatory action, with its characteristic exudation, spreads from the fauces and pharynx to the

larynx and trachea; the larynx being often chiefly affected in such cases, and, from its irritability and conformation, giving rise to a more spasmodic and dangerous form of the disease;—(l) That the danger attending the complications of croup is to be ascribed not only to this circumstance, but also to the depression of vital power, and the characteristic state of fever accompanying most of them, particularly in their advanced stages;—(m) That irritation from partially detached membranous exudations in the pharynx, or in the vicinity of the larynx or epiglottis, may produce croupal symptoms in weak, exhausted, or nervous children, without the larynx or trachea being themselves materially diseased; and that even the sympathetic irritation of teething may occasion the spasmodic form of croup, without much inflammatory irritation of the air-passages, particularly when the *prima via* is disordered, and the membranes about the base of the brain are in an excited state;—(n) That the predominance in particular cases of some one of the pathological states noticed above (g), as constituting the disease, and giving rise to the various modifications it presents, from the most inflammatory to the most spasmodic, may be manifested in the same case, at different stages of the malady, particularly in its simple forms, and in the relapses which may subsequently take place; the inflammatory character predominating in the early stages, and either the mucous or the spasmodic, or an association of both, in the subsequent periods;—(o) That the relapses, which so frequently occur after intervals of various duration, and which sometimes amount to seven or eight, or are even still more numerous, may each present different states or forms of the disease from the others; the first attack being generally the most inflammatory and severe, and the relapses of a slighter and more spasmodic kind; but in some cases this order is not observed, the second or third, or some subsequent seizure, being more severe than the rest, or even fatal, either from the inflammation and extent of exudation, or from the intensity and persistence of the spasmodic symptoms,—most frequently from this latter circumstance. The above inferences, however minute or trite they may seem, should not be overlooked, as they furnish the safest and most successful indications of cure, and are the beacons by which we are to be guided in the treatment of the disease.

42. VI. TREATMENT.—i. THE CURATIVE TREATMENT OF CROUP. I shall first state the method of cure on which I would chiefly rely in the different modifications of the disease; and afterwards notice some of the remedies which have been recommended by various writers. Several of these are of great benefit in certain circumstances of the disease; but we can seldom depend upon any one of them: it is on a judicious combination and sequence of means that we should chiefly rely; and upon the adaptation and co-ordination of these in particular cases. The *intentions of cure* are—1st, to diminish inflammatory and febrile action, when present; and to prevent, in these cases, the formation of a false membrane, or the accumulation of albuminous matters in the air-passages;—2d, when the time for attempting this has passed, or when it cannot be attained, to procure the discharge of these matters;—3d, to subdue spasmodic symptoms as soon as they appear; and, 4th,



to support the powers of life in the latter stages, so as to prevent the recurrence of spasms, and to enable the system to throw off the matters exuded in the trachea.

43. *A. Treatment of the common and inflammatory Croup.*—*a.* If the practitioner see the patient in the *first stage* (§ 6.), particularly if hoarseness, or a rough cough, with other catarrhal symptoms, be present, it will be proper to give an active antimonial emetic, with the view of fulfilling the *first* of the above intentions. This will often bring away a considerable quantity of a thick, glairy, and sometimes slightly sanguineous matter from the trachea, and will give immediate, although generally only temporary, relief. If the matter discharged from the air-passages present the above appearances; if the child be plethoric, the pulse at all excited, and the countenance flushed; we should not be deceived by the calm following the full operation of the emetic, but should have recourse to blood-letting. In the majority of instances, cupping between the shoulders or on the nape of the neck, or the application of leeches on the sternum, to an extent which the age, habit of body, and strength of the patient may warrant, will be preferable to venæsection. Under these circumstances, particularly when the nausea occasioned by the emetic has hardly subsided, the abstraction of little more than an ounce, or an ounce and a half, of blood, for every year that the child may have completed, will be borne. In town practice, the local is preferable to general blood-letting; but the latter will be adopted, with advantage, in the country, amongst plethoric and robust children. The advantages of depletion and antimonials are attributable to their influence in arresting the inflammatory action, and, from the consecutively accelerated absorption of fluids into the circulation, to the relative diminution of the albuminous constituents of the blood.

44. Immediately after depletion, and an emetic, the best internal medicine undoubtedly is *calomel* and *James's powder*—from three to five grains of the former, and two or three of the latter. This powder may be repeated every second, third, or fourth hour, until two or three doses have been taken. After the first dose, the child should be put in a tepid bath; and be allowed as much tepid diluents as the stomach will bear, in which sub-carbonate of soda may be dissolved, and which may be rendered agreeable with syrup. If the powders, given to the extent now mentioned, have not acted upon the bowels, castor oil, or some other purgative, assisted by an emetic, should be administered. These means will seldom fail of cutting short the disease. If, however, it still proceed, the means to be employed in the next stage should be adopted according to the circumstance of the case.

45. *b.* The *second or developed stage* is that in which medical aid is most frequently resorted to; and at this period, conformably with what has been stated (§ 39.), the disease is actually further advanced than the symptoms indicate. At its commencement, however, the *first intention of cure* should be attempted; but the most decided means will be now requisite to attain its fulfilment. These should be put in practice, even although the treatment already recommended may have been employed in the preceding stage.

An active *antimonial emetic* should be instantly exhibited, so as to produce full vomiting; and immediately upon the conclusion of its operation, *blood-letting*, general or local, must be resorted to. The abstraction of a greater quantity than that indicated above (§ 43.) will seldom be more beneficial; nor, indeed, will it be borne without producing syncope, which, in children, especially, should be avoided, as favouring the supervention of convulsions or reaction. But it may be requisite, particularly when the patient has not lost any blood during the preceding stage, to repeat the depletion. On this, or on any future occasion of repeating it, local blood-letting, in the situations and mode already mentioned (§ 43.), is now to be preferred. If it have not been prescribed previously, the *calomel* and *James's powder* should be given every two or three hours, until three or four doses are taken; and the adjuvants directed to accompany and to follow this medicine in the first stage, should also be employed in this.

46. Having thus carried depletion as far as seems prudent, and fully evacuated the *prima via*, and a very obvious improvement have not taken place, or if the suffocating seizures recur notwithstanding, a blister should be applied between the shoulders, on the nape of the neck, or on the epigastrium, *but never on the throat*; and if symptoms of febrile excitement still attend the seizures, a full dose of tartar emetic should be given, so as to excite vomiting again, and be repeated until it has this effect fully. If the urgent symptoms and fever still continue, *vomiting* may be excited a third or fourth time, at intervals of two or three hours. The tartar emetic is, upon the whole, the best medicine for the purpose in the early or inflammatory states of the disease, and may be given in doses of half a grain, in simple solution, to a child two or three years old, as advised by Dr. CHEYNE, and repeated at about half an hour, or sooner, if vomiting be not induced. M. GUERSENT prefers ipecacuanha, and advises blood-letting to precede the exhibition of emetics. Where the inflammatory action is considerable, this method may be adopted; but where we may expect to bring away the exuded matter by means of an emetic, before it has concreted into a membrane, it will be as well to exhibit one without delay, and to keep up a constant nausea by the same medicines given in frequent and small doses.

47. If the symptoms continue notwithstanding the judicious use of the above means, we should infer the formation of a false membrane, unless the exacerbation be altogether spasmodic—the breathing and voice becoming natural, or nearly so, in the intervals. The measures to be employed now should have reference to the separation and discharge of the concrete exudation, and the removal of spasmodic symptoms—to the fulfilment of the *second and third intentions* proposed. Bleeding, even if the state of the patient would admit of it, would not promote these intentions; and the exhibition of *calomel* or *mercurials*, excepting with the view of promoting all the abdominal secretions and excretions, and thereby to derive from the diseased organ, would not materially assist our views, inasmuch as it is impossible thereby to affect the system of children so as to prevent the formation of coagulable



lymph. In this case, we should assist the operations of nature in detaching the false membrane. It has been stated, that this is accomplished by the effusion, by the excited follicles, of a fluid matter between the concrete substance and the mucous coat; therefore those medicines which have usually the effect of increasing and rendering more fluid the mucous secretion of the air-passages, should now be prescribed. But care should be taken not to exhibit these, or any other *expectorants*, too early, or until depletion has been carried sufficiently far. They are most serviceable about the termination of the second, and the commencement of the third stage. The medicines best calculated to act as expectorants in this disease are, the preparations of *squills*, of *ammoniacum*, of *senega*, the *sub-carbonates* and the *sulphurets* of the *alkalies*, and *camphor*. The *oxymel* or *syrup* of *squills* may be given, either alone, or with some one of the *sulphurets*, or with *senega*, and generally to the extent of keeping up a slight nausea, unless the exacerbations of cough and suffocation be severe, when full vomiting should be produced by their means. I prefer the emetic effect at this period to be obtained by *squills*; as *antimony* lowers too quickly the vital power, which ought now to be supported, so as to enable the diseased organ to throw off the morbid matter formed upon its surface. A mixture, consisting of decoction of *senega*, with *vinum ipecacuanhæ* and *oxymel* of *squills*, may also be adopted with equal advantage. When the medicines fail of exciting vomiting, the pharynx should be irritated by a feather. I have seen very much benefit derived from this simple means; and have considered it more beneficial than any other, in the third stage, in promoting the discharge of matters from the trachea. JURINE also places great reliance on it. When severe exacerbations, with spasm and threatened suffocation, occur, it is always most advantageous to produce instant vomiting. The sulphate of zinc has been advised by M. GUERSENT, and the sulphate of copper by Dr. HOFFMANN, for this purpose.

48. During this and the preceding stages, the *inhalation* of watery and medicated vapours may be resorted to. At the commencement of the disease, vapours of an emollient kind are most beneficial; but when we wish to promote expectoration, *camphor* may be added to the substance used in this way. HOME, CRAWFORD, PEARSON, ROSEN, PINEL, and GOELIS, have approved of this practice. When spasmodic symptoms manifest themselves, *inhalation*, assisted by the *tepid* or warm bath, is often of use; but *antispasmodics* should also be prescribed with the other medicines, or in enemata. I have never seen any permanent advantage derived from narcotics given by the mouth, except from *opium* or *syrup* of poppies, combined with *antispasmodics*; probably owing to their lowering the vital energies, which are always much depressed when nervous symptoms appear. Great care should be always taken in exhibiting *opiates* in clysters to children: in very young children the practice is attended by much risk. *Opiates* are given to greatest advantage with *ipecacuanha*, as in DOVER's powder, or with *camphor* or *calomel*, or with both. I have likewise found *camphor*, with James's powder and *hyoscyamus*, of much benefit in some cases in which I have prescribed it. The *hydro-*

*sulphuret* of *ammonia* may likewise be tried, in both this and the next stage of the disease.

49. In many cases, the judicious use of blood-letting, *calomel*, *antimony*, &c. will cut short the disease, even although the patient may not have been treated until this period has been far advanced; and in others, the active use of these means may give rise to very alarming depression of the vital energies, even when they may have succeeded in removing the cause of obstruction and irritation in the air-passages. In these, stimulants, *antispasmodics*, and *restoratives* must be immediately resorted to, but with great caution, lest the inflammatory action be reproduced by their means.\*

\* The following case will illustrate the above observation, and may prove instructive to the less experienced reader. I have extracted it *verbatim* from my note-book, with the remarks suggested at the time appended to it:—

William Hodson, aged five years and a half, was seized, on the 17th of Nov. 1821, with hoarseness, fever, and a ringing, dry cough. The mother opened its bowels with salts, and gave it some antimonial wine. The following day, in the evening (18th), I saw it. There was much fever, with flushed countenance, and a constant, hard, and ringing cough, with a sibilous noise on respiration. Pulse frequent and hard; skin harsh and dry; great restlessness, tossing, dyspnoea, with hoarseness, and the characteristic breathing of croup. I directed blood-letting from a vein in the arm; and the blood was allowed to flow in a full stream till approaching syncope was indicated, seven ounces being abstracted; and the following powders were directed to be taken every ten minutes, till full vomiting; and subsequently every three hours:—

No. 162. R. Hydrarg. Submur. gr. xxx.; Antimon. Tart. gr. iij.; Ipecacuanhæ gr. vj. Misce benè, et divide in Pulv. viij.

Early in the morning of the 19th I again saw the child. The powders had been given, as above, until full vomiting had been produced; and one powder had been taken subsequently. The sense of suffocation had disappeared after the vomiting. The matters ejected contained much thick, ropy mucus, with membranous shreds of firm coagulated lymph floating in it. The cough and croupy symptoms had disappeared; the voice was clear, and the respiration easy; but now the child complained of distressing sickness, with frequent vomiting and purging: the stools were first bilious, offensive, copious, and feculent; but they had now become watery. The pulse was extremely frequent, so as scarcely to be counted; and so small and thready as hardly to be felt at the wrist. The countenance was pale and sunk; the skin cool and moist; and all the symptoms of sinking of the powers of life very manifest. The powders were discontinued, and the following mixture directed:—

No. 163. R. Aq. Cinnam. 3 iijss.; Spirit. Ammon. Arom. 3 jss.; Tinct. Opii M xv.; Syrup. Scillæ 3 iij. M.

Two teaspoonsful of this were to be taken every ten or fifteen minutes, until a decided effect from it was evident. After four or five doses, the stools and sickness were restrained, and the child fell into an easy and sound sleep.

A blister was now applied to the sternum, which was to be removed at the end of four hours, and poulticed with a bread-and-water poultice. The semicupium to be employed afterwards, and at bed-time. Three grains of *calomel*, with one of James's powder, to be taken at night; and the mist. *camphoræ*, with liq. ammon. acet., vini *ipecacuanhæ*, and syrup. *papaveris*, every three hours. Linseed tea, or barley water, with sugar-candy or liquorice, for common drink.

20th.—All the symptoms of croup had disappeared; but there was still some cough and fever, with occasional paroxysms of difficult breathing. The bowels had been open this morning; pulse 120, and small. Antimonial wine was added to the mixture; and an injection directed, with *assafœtida*, *spiritus terebinthinæ*, *oleum ricini*, and *camphor*.

In the evening.—He had had no return of the paroxysms since the injection, which was retained above an hour, and had procured two evacuations. Pulse 116; cough less frequent; skin more natural. The blistered surface had risen in some parts, and was inflamed in all.

From this time he continued to recover: diaphoretics, demulcents, aperients, and the semicupium, being employed until convalescence was complete.

Remarks.—It is by no means unusual to find a recurrence of the inflammatory and local symptoms, after they have been apparently most completely subdued by means similar to those employed in the foregoing case; and even after the powers of life, and all local inflammation and febrile ac-



50. *c.* The treatment of the third stage, either when the patient has not been earlier seen, or when previous measures have failed, should be directed with the view of fulfilling the *second* and *third* indications of cure, and at the same time with due reference to the *fourth*—the preservation of the exhausted nervous and vital powers. The chances of recovery are now very few; but these few should not be neglected. Many of the remedies already mentioned, especially *expectorants*, should also be exhibited in this stage; and these ought occasionally—particularly when the symptoms become very urgent—to be given so as to exert a speedy emetic action; and be combined with *antispasmodics*—with either camphor, ammonia, æther, musk, valerian, assafoetida, the oxide of zinc or bismuth, the sulphurets of the alkalies, &c.; and the same medicines, or the infusion of valerian, may also be prescribed in enemata, especially when spasmodic or nervous symptoms are predominant. When *emetics* are required in this stage, those substances which are exhibited in smaller doses in the remissions, in order to act as nauseants or expectorants, are amongst the most eligible—particularly squills, senega, the sulphate of zinc. The *inhalation* of the vapour of ammonia, camphor, or æther, in that of warm water; or of the fumes of warm vinegar, either alone, or with camphor; is sometimes productive of benefit in this period. Some advantage may also be derived from *sternutatories* blown into the nostrils, as advised by LENTIN and THILENIUS. I have seen, in two or three instances, the sneezing occasioned by them favour remarkably the discharge of the false membranes from the trachea; common Scotch snuff having been used for this purpose.

51. The *tepid bath* may be resorted to both in this and the preceding stage, once or twice daily, or according to circumstances; and either the sulphuret of potash, or the sub-carbonates of potash or soda, may be put in the water; and, if a tendency to collapse becomes apparent, the bath should be *warm*, and some mustard may also be added. *Blisters* between the shoulders, or on the sternum, may likewise be tried; but they always require great discrimination and care, in order to avoid unpleasant consequences from them. They should not, in this stage, remain on longer than from four to eight hours. HOME and THILENIUS advise them to be applied to the neck; LENTIN and GOELIS, to the neck and sternum; and ROYER-COLLARD, between the shoulders or on the arms; MAERCKER states, that he has derived but little benefit from them. OLBERS and ROYER-COLLARD speak favourably of sinapisms placed on the lower extremities. I have, however, seen more advantage accrue from rubefacient liniments (F. 299. 304.) or epithems,

tion, had been equally depressed. This recurrence of the acute symptoms seems owing to either an over-active use of stimulants, or an injudicious choice of them in the collapse occasionally following the decided use of blood-letting and antimony. Sometimes it arises from exposure to cold, or a current of cold dry air; and then, generally, a distinct chilliness or rigor is previously felt. Occasionally I have traced it to a too early recourse to food, or articles of a too stimulating and indigestible description. Inattention to the state of the bowels will also dispose to it; and even a blister applied too near upon the seat of disease has evidently produced such an effect, especially in thin irritable children. In no case would I permit a blister to be placed upon the throat, so firmly am I persuaded that mischief is occasioned from it in this situation.

applied on the epigastrium and chest, or between the shoulders. During this, as well as the preceding stage, a *cathartic* action should be exerted upon the bowels, unless the medicines previously exhibited occasion diarrhoea, or dysenteric symptoms. Medicines of this description are beneficial, as active derivatives from the seat of disease, and as evacuants of morbid secretions. Calomel, with jalap, may be given, either alone, with musk, or some other antispasmodic medicine; but, in every instance, the occasional exhibition of an enema should not be neglected. OLBERS, ALBERS, and JURINE, strenuously advise large doses of *musk* to be exhibited; and KENDRICK and ROYER-COLLARD, *assafoetida* to be administered in clysters. The *affusion of cold water* on the head has been sometimes resorted to by HARDERS, SCHMIDT, and myself, when the preceding means have failed, particularly if congestion or other cerebral symptoms have supervened, and the exacerbations have assumed chiefly a spasmodic form.

52. *B.* Treatment of the humid and spasmodic Forms of Croup.—*a.* In the *humid* or *bronchial form* of the disease, the intentions of cure are,—1st, to subdue inflammatory action; 2d, to remove the matters exuded from the air-passages; 3d, to calm spasmodic action; and, 4th, to support vital power. These can be attained only by *bleeding*, general or local, as already advised, but never from the throat itself; in the early stages by antimonial *emetics*, and subsequently by those consisting of ipecacuanha or sulphate of zinc; by *calomel*, with James's powder, as prescribed above, and afterwards with other *purgatives*, as scammony or jalap; by *cathartic enemata*; by *external derivatives*; and, lastly, by *antispasmodics* and *diffusible stimulants*. Of these, individually, little need be added to what has been already advanced. More advantage seems to be derived from *purgatives*, in this, than in any other form of the disease. I have sometimes seen them bring away a thick, gelatinous, glairy secretion, similar to that discharged from the air-passages in the advanced stages. Their operation should be promoted by the administration of purgatives in antispasmodic clysters, as extract of colocynth with assafoetida, valerian, or camphor; and if spasmodic symptoms become urgent, the sulphurets or sub-carbonates of the alkalies, and either of the various antispasmodics already mentioned, may also be taken by the mouth, particularly camphor, with James's powder, or Kermes mineral, or ipecacuanha, with spirits of nitre, æther, or other diaphoretics. The medicated *tepid* or moderately *warm bath*, *blisters*, rubefacient *liniments*, the *inhalation* of simple or medicated vapours, may also be resorted to in the manner detailed above. In the last stage, when the powers of life indicate exhaustion, ammoniacum, senega, oxymel of squills; and camphor, assafoetida, musk, ammonia, the æthers, &c. in full doses; and rubefacient and stimulating frictions, liniments, and baths, with the rest of the treatment already recommended at this period; are the chief means in which we can confide.

53. *b.* In the *spasmodic form* of the malady, the indications of cure are very nearly the same as now stated; but the treatment will necessarily vary with the extent to which inflammatory



irritation may be supposed to exist either in or about the larynx, particularly soon after the appearance of the disease; or about the medulla oblongata, in its more advanced course. In that state of constitution in which this form is most frequent, bleeding is seldom required beyond that procured by a few leeches applied to the nape of the neck, when we infer the presence of inflammatory irritation in the above situations. In this modification, whether occurring primarily, or in relapses, *antispasmodics*, given both by the mouth and by clysters, are indispensable; but *emetics*, and afterwards *cathartics*, medicated *tepid* or *warm baths*, and *inhalations*, *blisters*, or *rubefacient frictions* and liniments along the spine and over the epigastrium, and the *cold affusion* on the head, also constitute important parts of the treatment. The antispasmodics most to be confided in, are, the sulphurets and sub-carbonates of the alkalis, valerian, assafoetida, ammonia, camphor, musk, the preparations of æther, the oxides of zinc and bismuth, and the liquor ammoniæ acetatis, with excess of ammonia. Mr. KIMBELL states, that he has derived most advantage from the internal use of arsenic, or sulphuret of potass, aided by regular attention to the bowels, the shower bath, and by blisters or anodyne frictions on the spine. Of arsenic I have had no experience in this affection; but I have given the preparations of bark, and used the other remedies he has mentioned, with advantage. If the above means do not soon remove the disease, irritation about the base of the brain or medulla oblongata should be suspected, and leeches ought to be applied on the neck; and calomel, with aperients, or with musk or camphor, exhibited once or twice daily, injections being also employed: cerebral symptoms should be always enquired after, and energetically treated when detected.

54. *C. Treatment of complicated and consecutive Croup.*—The treatment of the various complications of the disease must be directed according to the general principles now sketched; and with strict reference to the nature of the associated malady, to the period of the primary disease at which it appeared, to the characters of the attendant constitutional disturbance, and of the prevailing epidemic, and to the well-ascertained fact that local inflammations supervening in the course of continued or eruptive fevers, although they require depletions, do not admit of them to the same extent as those which occur primarily.

55. *a.* The association of croup with *inflammation of the throat*, and exudation of lymph in this situation, whether originating in the *pharynx*, which is rarely the case, or extending thither and to the air-passages from the fauces and tonsils, is one of the most frequent forms in which the disease presents itself, particularly when epidemic or infectious, and is, therefore, deserving of particular notice. But the treatment must, in a great measure, depend upon the degree in which either sthenic or asthenic inflammatory action and fever may be considered to exist. Although great increase of vascular action is present at the onset, in the majority of such cases; yet it is often attended by deficient vital power, and exhaustion soon takes place. Even in the most sthenic cases, the treatment which would have been of service at first, is soon

no longer admissible; whilst in other cases, and in some epidemics, very marked adynamia is manifested from the commencement. Much depends on the precision with which the exact nature of the case and the state of vital power are ascertained, and on having early recourse to judicious measures. As to the predominance of either of the states of morbid action alluded to, the frequency and tone of the pulse, the colour of the exudation in the throat, and of the parts surrounding it, and the continuance of the disease, are the chief guides. If the inflammation and exudation commence in the tonsils and spread downwards, if the exudation be of a light colour, and the inflamed parts of a lively hue, the pulse being strong, full, and not very quick, depletions, general or local, the use of emetics and nauseants, and the rest of the antiphlogistic treatment, are required; but the further the disease departs from these characters, the darker and dirtier the exudations appear, the more livid and deeper the colour of the inflamed parts, the quicker, softer, and weaker the pulse, the more should antiphlogistic measures be relinquished, unless in some cases to a moderate extent, and at the very commencement of the complaint; and the more ought we to have recourse to camphor, ammonia, the decoction of senega, ammoniacum, &c.

56. *b.* The nearer the complicated disease, in its local and constitutional manifestations, approaches to the *malignant form*, the more extreme is the danger, and the greater necessity is there for the exhibition of tonics and stimulants. In such cases, the decoction of senega, the infusion of serpentaria, or mixture of ammoniacum, may be prescribed, with camphor, and any of the compound spirits of ammonia; or the decoction of bark, with liq. ammon. acetatis and tincture of capsicum; or the sulphate of quinine, with infusion of roses, and the æthers; or either the chlorate of potassa, or the muriate or carbonate of ammonia, with camphor, musk, myrrh, assafoetida, &c. in suitable vehicles. When the paroxysms of suffocation become urgent, senega, preparations of squills, or F. 402., may be given in doses sufficient to produce vomiting, and repeated according to circumstances; and active stimulant and antispasmodic clysters be thrown up. The vapour of camphor and warm vinegar may also be employed, and various stimulating and aromatic fumigations resorted to. The mouth and throat should be frequently gargled, or washed, by means of a sponge fixed to the end of a piece of whalebone, with a solution of the chlorurets, or of the sub-borate of soda in camphor mixture; or with a weak solution of nitrate of silver,—a scruple to an ounce of distilled water,—as first advised by Mr. MACKENZIE; or with Goulard water, as suggested by Dr. HAMILTON; or with the chloric acid or chlorine in decoction of bark, or other stimulating detergents; and sinapisms or embrocations with Cayenne pepper, or rubefacient liniments (F. 300. *et cet.*), may be applied on the nape of the neck, or on the lower part of the chest, and on the epigastrium. In the complications of the disease with angina maligna, observed by LOEFFLER and BRETONNEAU, powdered alum was directed by them to be blown into the throat; and various other astringent and antiseptic powders may be employed in the same manner. When the characteristic eruption of scarlatina accompanies the affection of the throat and air-passages, the treat-



ment must be directed according to the same principles. In all cases of angina, attended with membranous exudation, whether the attendant constitutional disturbance present sthenic or asthenic characters, the local treatment advised by Mr. MACKENZIE should be adopted upon the appearance of the exudation on the tonsils or fauces, and a large blister should be applied early, as being the most efficacious means of preventing the extension of this form of inflammation to the pharynx, air-passages, or oesophagus.

57. *c.* The treatment of the complications with *aphthæ*, or with any of the eruptive fevers, will depend, as much as the foregoing, upon the state of vital power characterising the constitutional affection. The appearance of croupal symptoms in the course of small-pox—particularly confluent small-pox—will require nearly the same medicines as have now been recommended (§ 56.); and the washes advised to be applied to the mouth and throat will be equally serviceable in the *aphthous*, as in the *variolous* complication. When croup is consequent upon either *measles*, or *hooping cough*, vascular depletion is more frequently required than in almost any other complication, excepting that with inflammation of the throat of a sthenic kind, whether attended by albuminous exudation or not.

58. *D.* The affections consequent upon croup—or the states of disease which it excites, or into which it passes—require not only appropriate remedies, but also the application of them with strict reference to the primary malady, and the means by which it was combated. When it runs on to *bronchitis*, the latter affection commonly assumes the asthenic form, generally terminates fatally, and requires the treatment described in the art. BRONCHITIS (§ 70. *et seq.*). Its passage into *pneumonia* is attended with similar results; and depletions, unless they have been previously neglected, are not well borne. When *diarrhæa* or *dysenteric* symptoms are produced, in the latter stages, by the means used to remove the disease, we shall generally find the preparations of *opium*, and the warm bath, as hereafter to be noticed, of much benefit. A considerable number of cases, particularly those complicated with sore throat, terminate in *sinking*, or *exhaustion* of vital power, and not by suffocation. This circumstance should be kept in view in the treatment of the last stage; and its earliest indications be met with suitable stimulants and tonics (§ 56.). In cases presenting *imminent suffocation*, the question of *tracheotomy* should be entertained; but at the same time, with the recollection, that either exhausted vital power, the extension of disease to the bronchi, and the accumulation of viscid or concrete exudations in them, or inflammatory action, or emphysema of the lungs themselves, may tend individually, or in combination, to prevent the success of the operation, independently of the immediate contingencies to which it is liable. (See § 74.)\*

\* I may here adduce a summary of the practice adopted by the most experienced physician in France in this disease—the senior physician to the Hospital for Children in Paris. It will be seen how closely it agrees with my own, in a similar Institution in London:—

M. JADELOT considers croup as a kind of angina of the air-passage; presenting more violent symptoms, and having true paroxysms, separated by well-marked intermissions of a special character. He admits different degrees of the disease, without changing its nature. Bleeding by leeches, and emetics, are the agents he most

59. REMARKS ON VARIOUS REMEDIES ADVISED, AND ON THE OPINIONS OF AUTHORS RESPECTING THEM.—*a.* *Nauseants* and *emetics*. In the first stage of the disease, and in the commencement of the second, I have sometimes found that *tartar emetic*, given so as to produce and prolong a state of *nausea*, has so completely relieved the croupal symptoms as to prevent altogether the necessity of having recourse to blood-letting; and that in other, and more severe cases, the same medicine, exhibited so as to produce vomiting, and to continue the nauseating effect for some time afterwards, and thereby to prevent reaction supervening upon the emetic operation, has been followed by a similar result. *Emetics* have been much recommended after blood-letting, and the inhalation of vapour, and when the exudation is presumed to begin to loosen, by HOME, LENTIN, DARWIN, MAERCKER, PORTAL, SMITH, HECKER, VIEUSSEUX, RUMSEY, &c. When the patient has not been visited sufficiently early, this plan is certainly judicious. But when he is seen in the first stage, it will be better to attempt to prevent the formation of the false membrane, by exhibiting *nauseants* or *emetics* instantly, as now advised, and, unless the inflammatory symptoms are very severe, before having recourse to blood-letting. This early exhibition of emetics is sanctioned by CRAWFORD, CHEYNE, PINEL, HOSACK, THOMPSON, HUFELAND, ALBERS, SCHWILGUE, &c. Dr. GAISLER prescribes, on the invasion of the disease, tartarised antimony and oxymel of colchicum. Whilst vascular excitement continues, either this combination, or the antimony only, in repeated doses, as suggested by CHEYNE and MICHAËLIS, is the best emetic; but when we wish to detach the membranous exudation, the preparations of squills, alone, or with ipecacuanha, are preferable. In the more spasmodic form of the disease, ipecacuanha, as GOELIS remarks, is as suitable an emetic as can be adopted: but when it is found necessary to exhibit such a medicine in the last stage of the disease, or when it is associated with angina maligna, or attended by symptoms of depressed vital power, senega, squills, or the sulphate of zinc, given with stimulants and antispasmodics, or F. 402., are to be preferred. GOELIS recommends emetics in the first stage of the least inflammatory forms, and generally in the third

frequently employs in its treatment. Emetics alone have often sufficed to stop the disease, especially in weak, pale, or bloated subjects; but, in opposite cases, he insists on the application of leeches, and allows the blood to flow until the child becomes pale, and the pulse loses its strength. After the bleeding, he causes vomiting, several times in succession, at intervals of two or three hours; and the practice is attended by the greatest success, relief being very apparent after each vomit.

When the croup has arrived at the second period, without having been opposed, and the presence of a false membrane is suspected, M. J. directs leeches to be applied; but, the moment they fall off, he hastens to produce vomiting: and it is in this case that he employs, by spoonful, every ten minutes or quarter of an hour, the mixture called *anticroupal*\*, until full vomiting is produced. He insists, also, upon the use of errhines, and of derivatives applied to the skin and intestinal canal.

When the disease is very rapid, it has been a question whether or no we should commence by bleeding, or by an emetic. M. J.'s opinion is, that we should first bleed, if the child be robust, and if it present signs of congestion towards the superior parts: on the contrary, he would commence by vomiting, when the subject is pale and exhausted, and there is little heat or fever. (RATIER's *Medical Guide*, &c.)

\* R. Infusi Polygalæ 3iv.; Syrup. Ipecacuanhæ 3j.; Oxymel. Scillæ 3iij.; Antimon. Tart. gr. jss. Misce.



stage; but he prohibits them in the second or inflammatory stage, and when suffocation is threatened towards the close of the disease. When, however, tartarised antimony is employed, and nausea is kept up in the intervals between the emetic operation, as I have recommended above, bleeding being also employed, the reaction dreaded by this experienced writer will not come on. His objections to an emetic in the paroxysms of suffocation occurring towards the close of the malady, may be well founded, were antimony or even ipecacuanha to be then prescribed; but, when zinc, squills, and senega are conjoined with stimulants and antispasmodics, and their operation accelerated by irritating the pharynx, I have seen the air-passages thereby freed from the substances obstructing them, and the patient saved.

60. *β. Bleeding*, general or local, or both, although indispensably requisite in the great majority of cases, is not always of service. RUMSEY and HUGGENS remarked its injurious effects in the complicated cases they treated; and the more nearly the disease approaches to the spasmodic, and the febrile symptoms to the adynamic character, particularly in the complications, the more likely is it to be of little benefit, or even injurious, unless the state of action and habit of body evidently requires it. In the more inflammatory states, it should be promptly and fully performed; the use of nauseating medicines generally preventing the necessity of having recourse to very large or injurious depletions. GHISI, HOME, CRAWFORD, ROSEN, and others, have preferred general blood-letting at the commencement; and BAYLEY, MIDDLETON, BALFOUR, and numerous writers, have recommended the jugular vein to be chosen. TREBER, HIRSCHFIELD, WERNER, GOELIS, and MALFATTI, very experienced physicians in Vienna, employ local depletions, excepting in the most inflammatory cases; and I agree with them, differing only in preferring cupping to leeches. As to the *period* at which it should be resorted to, I believe, with GOELIS, that little will be gained by resorting to it before inflammatory action is manifested, or after excitement has subsided. A suppressed and apparently weak pulse, early in the disease, is often rendered full and hard by venæsection, and a repetition of the operation required, — a circumstance evincing the importance of interpreting aright the state of the circulation. Of forty-seven cases treated by GOELIS, in 1808, seven were bled from a vein; thirty-four by leeches only; and six were not bled at all. The average quantity of blood that I have found requisite to take, altogether, as nearly as I can calculate, is about five ounces in children of three years, seven or eight in those of five or six, and about ten ounces in those from ten to twelve. This result relates chiefly to those not seen until the second stage of the more inflammatory or common forms of croup. I have met with cases in which blood-letting had been chiefly confided in, and been carried to the utmost extent; but it certainly had seldom or ever cured the disease, when thus employed, and even sometimes had been evidently injurious. The celebrated WASHINGTON was said to have died of croup. He lost, at the age of sixty-eight, about ninety ounces of blood in twelve hours. An attentive perusal of the cases published by Dr. S. JACKSON (*Amer. Journ. of Med. Sciences*, vol. iv.

p. 361.) will show the inefficiency and injurious effects of excessive depletions.

61. *γ. Calomel and mercurial inunction* have been most strenuously recommended, the former especially, since it was first prescribed by RUSH, and in larger doses by STEARNS, MARCUS, AUTENREITH, ANDERSON, J. P. FRANK, NEUMANN, MICHAËLIS, and others, who gave it every three or four hours. HAMILTON directs it, in full doses, every hour or two hours at first, and subsequently at longer intervals; HECKER advises it in small doses; and WIGAND states that it is of no use. CHEYNE prescribes it with James's powder; HARLES and others, with the officinal preparations of antimony; SCHÆFFER, with emetics and musk; SCHLUTER, with oxyde of zinc and other antispasmodics; MICHAËLIS and NEUMANN, with expectorants; ARCHER, MARCUS, and HUFELAND, with decoction of senega, and mercurial inunction about the neck; and AUGUSTIN, with opium. In the stages attended by excitement, it is best conjoined with James's powder or tartarised antimony, as prescribed above; and sometimes with opium, or Dover's powder, and subsequently, if it be given at all, with purgatives; expectorants, antispasmodics, &c. being exhibited in the intervals. GOELIS conceives that it is useful in diminishing the tenacity of the croupal exudation, and in retarding its formation. He moreover supposes, that the daily exhibition of a small dose of this medicine subdues the diathesis, or constitutional disposition to contract the disease; and when croup has been prevalent, and appeared in one of a family, he has given about a grain at bed-time daily to each of the other children.

62. *δ. Blisters and counter-irritants* have been already mentioned; but there are certain points, particularly as respects the period and manner in which they ought to be employed, that require to be noticed. There are very few writers who have not recommended blisters in croup, but quite as few have done so with the wished for precision. On this subject GOELIS is more practically minute than any other writer; and in many respects his experience coincides with my own. I believe that most advantage will be derived from as early an application of a large blister as is consistent with the previous employment of blood-letting. Directly after the first depletion, therefore, one should be applied in either of the situations advised (§ 46.); a piece of fine tissue paper being placed between it and the skin. It ought to be removed upon the appearance of redness of the cuticle, and a warm bread and water poultice placed over the part, and frequently renewed. If blisters be used in the latter stages, they should be watched with great care, and be allowed to remain for a few hours only, and not a minute after slight redness is produced. I believe that the dangerous effects sometimes occasioned by them are owing to the want of these precautions, and to having recourse to them at a time when the vitality of superficial parts is soon exhausted, owing to vital depression and to deficiency of blood, consequent upon excessive depletion. The liberal use of calomel, particularly when it has not been carried off by purgatives, may also, by increasing the irritability of the tissues, dispose to unfavourable results from blisters. If prescribed at all, they should be of full size; they ought never to be applied over the



throat, as recommended by some writers; and, in very young and delicate children, it will be better not to place them over leech-bites. In the latter periods, I prefer to blisters, the use of warm poultices, on the surfaces of which Cayenne pepper and scraped camphor are sprinkled in quantity sufficient to produce redness of the cuticle; or the application of warm cloths, moistened with either of the liniments, F. 300. 307, 308. These are particularly useful upon the removal of the patient from a warm bath, especially in the complications of the disease. *Sinapisms* have been directed by many to be applied to the extremities; but I have seen more harm than benefit produced by them, from the distress and crying they occasioned.

63. *ε. Internal and external emollients* are sometimes useful auxiliaries, particularly in the first stage. The decoctum althææ, the mist. amygdal. dulcis, the inspissated juice of the sambucus niger, mucilages, with liquor ammoniæ acetatis, vinum ipecacuanhæ, and syrup (see F. 47. 389.), may be used internally; whilst warm fomentations, with decoction of camomile flowers and poppy-heads, are applied about the throat, and frequently renewed, upon the occurrence of hoarseness, cough, and difficult respiration. These have the effect of retarding the approach of the latter and more dangerous states of the malady, even when they fail of rendering more efficient aid. LENTIN advises camphor to be applied to the chest; but it will be more beneficial to employ it along with the fomentations, which may extend over both the throat and the upper part of the chest; or it may be placed upon warm poultices, as advised above, particularly in the more spasmodic and complicated states of the disease.

64. *ζ. Cold epithems* on the throat have been employed by some writers, and particularly by FIELD. They appear to have been of little service in his cases. I am unable to give any opinion respecting them from my own experience. They seem not to be equal to warm fomentations. GOELIS states, that they are dangerous means to resort to; and alludes to cases where they were injurious.

65. *η. Semicupium and pediluvium* are useful modes of derivation, in the first and second stages especially. But salt, mustard, and, in some cases, a little of either of the fixed alkalis, or of the sulphurets, should be added to the water, and its temperature gradually increased as immersion is prolonged. Great care is requisite in removing the patient from the bath, to prevent any chill. In many cases, it will be preferable to wring as dry as possible large pieces of flannel out of warm water prepared as above, and to wrap them round the lower limbs of the patient, changing them frequently, or prolonging the use of them, according to circumstances, and preserving the bed-clothes from moisture.

66. *θ. Tepid and warm bathing* are of service — the former in the early stages, the latter in the advanced periods, of the disease. GOELIS advises the tepid bath of about 23° or 24° of Reaum.; and to be rendered antispasmodic by using a decoction of chamomile flowers and poppy-heads; or irritant, by adding some caustic alkali; or both antispasmodic and derivative, by a combination of these substances, according to the circumstances of the case. I have, in a few instances, used these baths, upon the recommendation of this

writer, and certainly with marked advantage; but I have increased their temperature in the latter stages of the disease, rendering them, at the same time, more irritating by the addition of an alkali. In the early periods, however, the emollient and antispasmodic form of bath seems preferable, particularly when the patient breathes the vapour rising from it. The duration of immersion should seldom be shorter than twenty minutes, unless circumstances should prevent it; and I am convinced that it may be prolonged to two hours, with advantage, in some instances. In a case despaired of, I caused, upon the recommendation of GOELIS, the child to be put in a bath consisting of a decoction of chamomile flowers and poppies, to which some caustic alkali was added. It was kept there for twenty-five, and on a second occasion forty, minutes. It ultimately recovered. Care must be taken that the temperature of the bath does not fall during its continuance. As soon as the patient is removed, and the skin dried, he should be placed in warm flannel, or in a blanket; and perspiration encouraged by diaphoretics suited to the nature of the case and stage of the disease: in the early stage by antimony or ipecacuanha, so as to excite slight nausea, or occasionally vomiting, if requisite; in the latter periods, with liquor ammoniæ acetatis, given in sufficient quantity to produce the same effects; or, if sinking be apprehended, with camphor, ammonia, &c.

67. *ι. Purgatives* have been given with different intentions; — either as mere evacuates of retained secretions and excretions; or as active derivatives from the seat of disease. HOME, DESESSARTZ, and MICHAËLIS, seem to have resorted to them with the former intention; HAMILTON, PINEL, and AUTENREITH, with the latter view; CRAWFORD, THOMPSON, and others, prescribing also enemata. My own experience is decidedly in favour of this class of medicines; and of employing calomel, jalap, scammony, &c., and extract of colocynth, with assafœtida, &c. in enemata (§ 51, 52.).

68. *Sudorifics* are of use only in the early periods of croup. James's powder, and the other preparations of antimony, subsequently ipecacuanha, and liquor ammoniæ acetatis, or the one combined with the other, and given to the extent of exciting nausea, in conjunction with emollients (§ 63.), are important auxiliaries. GOELIS remarks, that DOVER's powder is seldom productive of any benefit; and that sudorifics are never of service in the last stages. Gentle *diaphoresis*, early in the disease, is undoubtedly beneficial, when the patient drinks freely of emollients; but he with justice adds, that very copious sweats only increase the disposition to form false membranes of a firm and adherent kind, owing to the evacuation of too large a proportion of the watery parts of the blood. In these opinions, TREBER, HIRSCHFIELD, and most of the Vienna physicians, agree.

69. *κ. Expectorants.* — Under this head may be ranked an important part of the remedies prescribed in croup. The *inhalation* of vapours has already been noticed. The experienced GOELIS places much confidence in them during the first and third stages; in the latter of which they often increase the cough, but they favour the discharge of false membranes, by increasing the mucous secretion by aid of which they are thrown off,



have mentioned (§ 47.) the expectorants in which my experience has led me to confide. There are very few which have been more generally recommended than *senega*. ARCHER, BARKER, VALENTIN, ROYER-COLLARD, LENTIN, MAERCKER, CARRON, &c. recommend it after bleeding. Dr. ARCHER, who attributes the greatest virtues to this medicine, advises it to be given at the same time as calomel, in frequent doses, until it excites vomiting or purging. GOELIS and TREBER remark, that, although a good remedy in the third stage, it is by no means possessed of those specific virtues attributed to it by Dr. ARCHER; and in this I agree with them. It is a useful medicine in the complications of the disease with malignant sore-throat or scarlatina. *Squills* are chiefly trusted to by HUFELAND, RUMSEY, and MAERCKER, in the latter periods. They should not be exhibited in the more inflammatory states of the malady, until after depletions have been carried sufficiently far, and we wish to procure the expulsion of the concrete exudations formed in the air-passages. They ought to be exhibited in small doses in the remissions, and pushed to the extent of producing vomiting when paroxysms of suffocation occur. After the membranous substances are removed, squills should be altogether laid aside. The *sulphuret of potash* has been recommended by Professors SERF, CHAUSSIER, MERCIER, and HECKER, in doses of about four grains, given every three or four hours. It is sometimes of much service after depletions. It may be combined with camphor, or small doses of *ipeacacuanha*.

70. *λ. Antispasmodics* have been very generally prescribed, and particularly by MICHAËLIS, PINEL, SCHWILGUE, VIEUSSEUX, &c., after the decided use of antiphlogistic remedies. HOME, CHEYNE, and GOELIS, consider that these medicines are of little use in common and inflammatory croup. I am, however, convinced, from extensive experience, that, when the inflammatory symptoms are altogether, or even nearly, removed by antiphlogistic medicines, when the disease passes into a spasmodic state, or presents from the commencement a predominance of such symptoms, and when increased irritability becomes manifest, a judicious exhibition of antispasmodic medicines is often attended with benefit. *Musk*, either alone or with other medicines, with calomel (MICHAËLIS and WIGAND), with squills, sulphuret of potash, or other expectorants, and with camphor or ammonia, in the last stage of the malady\*; *valerian*

\* The chief danger in croup often proceeds from the spasm with which the respiratory passage is affected in the progress of the disease. The obstruction of the tube by the false membrane and effused matter, seldom of itself causes suffocation; but rather this lesion, combined with spasm of the muscles of the larynx and membranous portion of the trachea; and, in many cases, exhaustion is superadded, or even constitutes the most important change. Depletions alone will not overcome this disposition to spasmodic action, which is generally observed to supervene at intervals; the periods elapsing between the paroxysms varying according to the strength and constitution of the child, and the severity of the disease. But, in many cases, the spasmodic action is more frequent and more dangerous, and the more likely to become associated with convulsions, the weaker the constitution and powers of life, and the more those powers have been reduced by copious depletions. After moderate depletion, therefore, and in many cases even previously to any, such medicines as possess an antispasmodic power, by first acting as nauseants, are of great benefit. M. KIMBELL seems to have partly adopted this view of the disease and of its treatment; but I am confident he has carried it much too far. If his success has been equal to what he conceives it to have been, the

and its preparations, and *assafætida*, or any of the other medicines of this class mentioned above, may be employed, either alone, or with expectorants and opiates, particularly when the energies of the system begin to be depressed, or the complaint assumes from the first a spasmodic character.

71. Of those medicines which are *antispasmodic* from their *sedative* operation, the most important are colchicum, opium, hyoscyamus, prussic acid, digitalis, and tobacco. *Colchicum* may be given combined with calomel, in the early and inflammatory states of the disease, or with ammonia or camphor, at a later period; but it ought, in young children especially, to be exhibited with extreme caution,—in very small doses, and carefully watched. It came into fashion in this and other diseases of the air-passages a few years since, and was, for a time, much employed; I then saw some cases of croup in which it had been very injuriously employed, from having been given in too large doses for the age of the child, or too long continued, or combined with other depriments, as antimony, &c., or exhibited after very large depletions. I can most truly assert, that I have seen at least two cases of croup, in which death was to be imputed to this substance, rather than to the effects of the disease; and yet it is sometimes of use when combined as I have now advised. Of *digitalis* I have had no experience in this complaint; if exhibited at all, it should be conjoined with calomel. *Prussic acid* has been employed in some cases which I have seen; but the same objections I have urged against colchicum apply to it, when prescribed for young children. In older patients it is sometimes of benefit, combined with camphor, or oxyde of zinc, or other stimulating antispasmodics, in combating the irritability and disposition to spasmodic paroxysms in the latter stages. *Opium* was much

cases which he has met with have been unusually slight. There is no doubt of bleeding, blistering, purging by calomel, &c. &c., having been pushed to hurtful lengths in many cases, or inappropriately applied; and the same may be said as to other means, which have tended more to exhaust the vital energies than to cure the disease; and there can be no doubt of the disposition to spasm becoming greater, and of its consequences being more to be dreaded, the lower the powers of life sink; for, with such sinking, the general sensibility and irritability of the frame increase. But I cannot conclude that those means could have been dispensed with in any considerable number of the cases which have fallen under my observation, and in which I have never omitted also to employ antispasmodics of the most active nature, from a conviction that the disease partly depends upon spasm. Mr. K.'s observations as to the treatment of the disease, are to the following effect:—"I never bleed or blister a child in croup: I have never thought it requisite to do so, since I have adopted the plan alluded to; although such auxiliary practice would be in no other respect incompatible, than as tending to invalidate the general strength. The treatment I allude to consists in confining the child to a uniform and rather warm temperature, giving an emetic of *ipeacacuanha*, and, in an hour after, commencing the following mixture:—

No. 164. *R. Pulv. Valerianæ 3 ij. ; Oxymel. Scillæ 3 j. ; Tinct. Opii gtt. xx. ; Aquæ Destillatæ 3 j. Misce.*

I administer a teaspoonful every hour, if the child is from two to five years old; if from five to eight, every five and forty minutes, so as to maintain the anodyne effect of opium, and the sub-nauseant expectorant, antispasmodic effects of the squill and valerian, until the symptoms are removed; which commonly happens in ten or twelve hours, and which I have never seen protracted beyond eight and forty. On their subsidence, I have, in general, given a brisk dose of calomel and jalap."

Mr. K. likewise recommends the above treatment in whooping cough and in catarrh; and in those cases which are unconnected with inflammatory action, it is not inappropriate. In the slight and more spasmodic states of croup, it also will prove very beneficial.



employed, after depletions, by KENDRICK and HUGGANS. It may be used both externally and internally (as may the preparations of *morphine*), with aromatics, camphor, or assafoetida, musk, &c., in the states of the disease now mentioned. *Henbane*, and *extract of poppy*, may also be employed under similar circumstances and forms of combination. *Tobacco* has been prescribed in croup, in various modes. Dr. VANDERBURGH and Dr. GODMAN recommended a plaster covered with Scotch snuff to be applied across the top of the sternum; and myself and others have employed this substance, with the view of detaching the false membrane by exciting sneezing and an increased secretion of mucus. The *smoke* of tobacco has also been directed to be inhaled, in order to remove spasm, and promote expectoration, by its direct operation in the air-passages; and others have advised the patient to smoke a cigar, with the intention of producing nausea, as well as the other effects last enumerated. After depletion, and when the disease is about its acmé, the powers of life not being materially exhausted, a cautious use of this means may be serviceable. In the case of children who cannot use a cigar, the smoke of one may be blown around them, and in this way it will have a sufficient effect. Cloth moistened with an infusion of tobacco may, under some circumstances, be applied over the throat, and its effects carefully watched; but this measure is not without hazard, particularly after lowering remedies have been used, or in an advanced stage of the malady.

72.  $\mu$ . The preparations of *ammonia* have been much employed in all the states of croup, *Cautic ammonia*, in doses of three or four drops, given every hour; ammoniacal liniments being at the same time applied about the throat; has been advised by some writers, in order to promote the excretion of the concrete exudations in the third stage of the disease. The *carbonate of ammonia* has been more generally employed. M. RECHOU prescribed it both internally, and externally in ointments to the throat. In the latter stages, as a useful antispasmodic stimulant, it may be sometimes of service; it is very advantageously combined with camphor, or even with calomel, in the complications of croup with angina maligna, or with any of the eruptive fevers. M. CHAMERLAT has recommended the *muriate of ammonia* to be taken internally, and applied to the fauces, when the disease is associated with inflammation of the throat. The *cuprum ammoniatum*, and the *hydro-sulphuret of ammonia*, have also been prescribed in doses suitable to the age of the patient. They may be sometimes of service in the more spasmodic states; but I have had no experience of their effects in this complaint.

73.  $\nu$ . M. VALENTIN has recommended the application of the *actual cautery* upon each side of the throat, in the most severe forms of the disease, when it is at its acmé. *Moxas* seem to be preferable to the actual cautery; and, if this practice should be adopted, it might, perhaps, be advantageous to follow it, by fomentations placed over the trachea. M. DUPUYTREN employed in one case, referred to by GUERSENT, a small rod of whalebone covered by pieces of sponge, which was introduced into the pharynx in order to remove the partially separated portions of false membrane lodged in that situation, or partly

thrown out from the larynx. In the advanced stage of croup complicated with angina pharyngea, this contrivance is calculated to succeed.

74.  $\xi$ . *Tracheotomy*.—There does not seem to be a chance of success from this operation in any case wherein the treatment developed above has failed. The practitioner, however, may be called to a case so late in the disease, and where the suffocation is so imminent, that the propriety of having recourse to it may be admitted; but, even in these, the chances are infinitely greater against than in favour of its success; and if benefit can be obtained from any measure, it is as likely to accrue from the energetic exhibition of suitable emetics as from tracheotomy. Cases have doubtless been recorded of the success of the operation in croup; but these are so very few, compared to the number in which it has failed, that I perfectly agree with GOELIS, CHEYNE, ROYER-COLLARD, PORTER, WOOD, and many others, in concluding that it should seldom or never be attempted in this disease. Of the propriety of having recourse to it in certain states of laryngitis, &c. there can be no doubt; and it may, with some slight grounds of hope, be resorted to when croup is chiefly confined to the larynx and upper portion of the trachea; also, perhaps, in some cases of its consecutive occurrence upon inflammation of the throat with membranous exudation; and when we infer, from the general symptoms and the signs furnished by the stethoscope, that the bronchi and lungs are unaffected; but in that period of the simple as well as of most of the complicated forms of the disease, in which only it should be attempted, and when internal treatment has failed, I believe that the superinduced lesions in the bronchi, lungs, circulating fluid, and nervous system, are such as to preclude hopes of its success. Moreover, the feelings of the parents regarding it, and the reputation of the physician and operator, are not to be kept out of view. “Ad tracheotomiam,” says GOELIS, “omnium remediorum incertissimum confugere res ardua est; parentes abhorrent, aversantur agnati et periclitatur medici fama, quem, infausta si fuerit operatio ac votis illudens, lacrymis multis velut homicidam prolis amatæ detestantur parentes.”

75.  $\text{ii}$ . PROPHYLACTIC TREATMENT, &c.—A. GOELIS states, that he never saw a child with por-rigo and other chronic cutaneous affections attacked by croup whilst they remained fully developed, even when this disease was most prevalent. He therefore advises the having recourse to any form of issue, when an attack is dreaded. To resort, however, to emetics, to antimonial medicines, to counter-irritants, to depletions, to confinement in-doors one half of the year, and other measures which have been advised, is attended with greater mischief than to allow the child to run the slight risk there is of his having the disease. The case, however, is different in respect of a child who has once suffered an attack. The liability of croup to recur, even several times, after intervals of various duration, renders precautions, under such circumstances, very requisite. The chief of such measures are—removal from the predisposing and exciting causes (§24—31.); change of air and locality; the use of the shower or cold bath every morning, the skin being well rubbed with a hard or coarse cloth afterwards; the wear-



ing of flannel next the skin, and of a neckcloth in winter and spring; light nourishing diet, with strict attention to the secretions and excretions; immediate recourse to medicine upon the appearance of catarrhal or croupal symptoms; and a careful avoidance of exposure to cold and moisture. When croup occurs in one child of a family residing in situations where it prevails, more will probably be attacked. In such cases, removal to a healthier air is requisite. When it is prevalent either in a simple or complicated form, and particularly when the locality also increases the risk of seizure or relapse, the occasional exhibition of small doses of calomel and James's powder, or of hydrarg. cum creta with the sub-carbonate of soda, or the having recourse to either of them every second or third night, may be tried. In this country, care should be taken not to expose children to the north-east winds of spring, particularly when they follow heavy rains, &c.

76. *B.* The DIET and REGIMEN, in the more acute and inflammatory forms of croup, should be strictly antiphlogistic; and all food should be withheld until the stage of exhaustion supervene, when, if light nourishment can be taken, or be desired, it should be given. In the more spasmodic or prolonged forms, light food may be taken in small quantity. The best beverage of which the patient can drink, is a very weak decoction of marsh-mallows and liquorice root, to which a little candy and sub-borate of soda are added. The temperature of the room should be moderately and equably warm.

77. *C.* DURING CONVALESCENCE, change of air, as soon as it can be safely permitted, is especially beneficial; and strict attention ought to be paid to the prophylactic means stated above (§ 75.), in order to prevent a relapse or recurrence of the malady. These precautions are required during, and for some time after, recovery from the complications and consecutive affections of croup, as well as from its simple forms. In the winter and spring months especially, the convalescent should be kept in apartments moderately and as equably warm as possible.

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CYANOSIS. See BLUE DISEASE.

CYNANTHE MALIGNA. See FEVER, SCARLET; FAUCES; and PHARYNX, *Inflammations of*.

CYNANCHE PAROTIDÆA. See PAROTID, *Inflammation of*.

CYNANCHE PHARYNGEA. See PHARYNX, *Inflammations of*.

CYNANCHE TONSILLARIS. See TONSILS, *Inflammations of*.

CYNANCHE TRACHEALIS. See CROUP.

CYSTITIS. See URINARY BLADDER, *Inflammations of*.

DEAFNESS. See EAR, *Diseases of*; and HEARING, *Disorders of*.

DEBILITY. — SYN. *Adynamia, Asthenia, Atonia, Debilitas*, Lat. *Die Schwäche, Schwachheit*, Ger. *Débilité, Asthénie*, Fr. *Debolezza*, Ital. *Vital Depression, Diminished Vital Power or Energy*.

CLASSIF. — GENERAL PATHOLOGY; *Pathogeny*. — SPECIAL PATHOLOGY. I. CLASS.

1. DEFIN. — *That departure from the healthy condition of the frame, which consists of a diminution of its vital energies — of an enfeebling of its powers, manifested in numerous conditions and grades throughout the whole frame, or more or less remarkably in particular systems or organs.*

2. *Debility* is a state of vital manifestation intimately connected with the nature of disease; and, in whatever acceptation it has been understood, it has been admitted by every physician who has looked beyond the grosser and more palpable changes superinduced in the economy, as not only a most important pathological condition, but as often constituting what is, in the common language of medicine, disease itself. It often performs a principal part in the commencement, and towards the close, of the most severe maladies; and its modifications are amongst the most difficult in pathology to detect and to interpret aright. Several of the appellations it has received have been more or less restricted to certain of its conditions; as *adynamia*, to want of muscular or animal power; *atonia*, to deficient vital tension and tone of circulating and exhaling vessels; *asthenia*, to depressed energy of organs essentially vital, &c.: but as the distinctions between them have never been made with sufficient precision, and have seldom been preserved, and as they have all been used synonymously by the best modern writers, they will be thus received at this place.

3. It might appear interesting to ascertain the varieties and grades of debility; but this is a matter of no easy accomplishment, if not entirely beyond the reach of our powers. Debility is, besides, a relative term; and of its extent or degree of departure from that condition of vital power requisite to the perfect performance and continuance of the functions, we can form no very precise idea, even were we agreed upon the standard of power by which the comparison should be made. Of its numerous grades and manifestations, from the slightest departure from health to the utmost consistent with existence, there can be no question; and therefore they cannot be otherwise than arbitrarily appreciated. This will appear obvious to any one who will refer to the numerous varieties into which VOGEL and SAUVAGES have divided *asthenia*.

4. DIVISIONS OF. — It will be preferable, therefore, to consider debility in respect merely

of its principal conditions relatively to the operation of the chief causes which induce it; and, in order to elucidate its morbid relations, and its influence in producing and perpetuating further disease, to enquire into its manifestations and effects on the various general systems and organs of the body. The majority of pathological writers have found great difficulty in considering this subject, and scarcely any two have agreed as to the manner of discussing it, or as to its nature. Some have viewed it as the negative of excitation, or a minor degree of that state of excitement induced in the system by the agents surrounding and acting upon it, — by privation, or change of the factors of life (HARTMANN). This opinion, which may be traced to the *Strictum* and *Laxum* of THEMISON; but which was first insisted on, in a manner at all accordant with the doctrine of solidism, by BROWN, and variously modified and illustrated by his contemporaries and followers; led to the division of this grand pathological state into two forms, — *direct* and *indirect* debility. This division was adopted by DARWIN; and RUSH followed the same track, denominating the former *debility from abstraction*, the latter *debility from action*. RASORI and TOMMASINI hardly even modified the doctrine of BROWN, when they divided it into *primary* and *secondary*; the former arising from contra-stimulating, the latter from stimulating, impressions. BROUSSAIS followed a similar arrangement; but considered that it is primary in very few instances, and only from the abstraction of stimuli. The simplicity of these divisions is their chief recommendation; but it is carried so far as to be inconsistent with the complexity of those derangements to which the human frame is subject. This feeling seems to have induced BOISSEAU to impute it to three sources: 1. To a complete or prolonged abstraction of the accustomed stimulus; 2. A diminution of the reciprocal stimulating influence of the organs; and 3. To the inordinate excitation of a part, rendering the others incapable of acting with energy. M. BRACHET, adopting similar views to my own, but several years after mine were published, both in the *London Medical Repository* and in my *Physiological Notes*, refers debility either to diminution of the action of the cerebro-spinal system, enfeebling the functions over which it presides, or to depression of the functions dependent upon the influence of the organic or ganglial nerves; the weakness of the nervous system arising, as he thinks, either from deleterious states of the blood, or diminution of its quantity. HUFELAND divides it into *true*, and *apparent* or *false*; the one from change of the nervous sensibility, the other from oppression of the vital powers. Dr. GEDDINGS, the most recent writer on the subject, considers debility, 1st, as *direct*, when arising from the abstraction of stimuli, or the operation of contra-stimuli, or such substances as “directly enfeeble the organisation;” 2dly, as *indirect*, or that resulting from exhaustion, and “from deterioration of the nutritive molecules of the blood;” and, 3dly, as *metastatic*, or that form proceeding from inordinate irritation of one organ leaving the others in a minor state of excitation. It is impossible to examine the conditions of debility with any degree of precision abstractedly from their principal causes. I shall, therefore, with due regard to



this connection, consider, 1st, The primary or direct states of debility; 2dly, Its consecutive or secondary conditions; and, 3dly, Those forms, consisting not only of depressed, but of otherwise morbid or vitiated, vital manifestation—or complicated debility. After having discussed these topics, with reference to *general debility*, the *more special* or *partial states of debility*, and its *consequences*, will be brought into view; and the subject pursued in its relation to general and special pathology.

5. I. CONDITIONS OF DEBILITY.—i. PRIMARY DEBILITY (*Direct*, BROWN; *True*, HUFELAND; *from Abstraction of Stimuli*, RUSH and BOISSEAU).

This state of debility is not so frequent as is commonly supposed, although by no means so rare as BROUSSAIS and his followers contend. Many of the cases commonly imputed to it strictly belong to the other conditions specified above (§ 4.). Primary debility may be, (a) *Original*, or congenital; and (b) *Acquired*.—A. The former of these is observed in the children of exhausted, dissipated, or aged parents,—especially the male parent,—and is familiar to every common observer. It also presents itself in the infants of those who are of a strumous diathesis, although generally in a slighter grade, and more frequently obscured by concurrent disease of particular organs. This form of debility seldom continues long without being followed by some specific malady, which it either remarkably favours, or even more directly produces,—causes, which are innocuous as respects infants of originally sound stamina variously affecting, and ultimately blighting the debilitated offspring.

6. B. *Acquired* debility presents itself to our notice in every stage of life. If it supervene in infancy and childhood, it may be, to a certain extent, perpetuated in the constitution through life. But, in whatever period it may occur, it is most frequently the consequence of the *abstraction of stimuli* necessary to the excitation and perpetuation of the vital manifestations to a requisite extent.—(a) The infant that is not *sufficiently*, or is injudiciously, or *unnaturally*, *nourished*, if it escape any of the maladies to which it is thereby disposed, becomes pale, languid, soft, and enfeebled, or altogether diseased: it wastes; its flesh is flabby; its growth is impeded; and it at last is the subject of anæmia, or of tubercles, or of worms, or of disease of the digestive canal, of the mesenteric and other glands, or of the joints and bones. But insufficient or inappropriate nourishment affects all periods of life in nearly a similar manner. A fish diet through life gives rise to a weaker conformation of body than food of a mixed kind. This was proved by PERON in respect of the natives of Van Diemen's Land. Similar effects follow an exclusively vegetable diet, although not to so manifest a degree. It should, however, be admitted that those who are obliged to live on one kind of food alone, are more liable to experience insufficient supplies of it.—(b) The abstraction of the *animal warmth* is another cause, occasioning a modified, and, as it were, an acute form of debility, followed by peculiar effects, which are fully described in the article COLD.—(c) The *privation of solar light* has a marked influence on the vegetable creation; plants being pale, sickly, and imperfectly de-

veloped, and their proper juices scantily and insufficiently elaborated. An analogous effect is produced by the same cause on the animal creation, and particularly on man—the body becoming pale, sickly, and etiolated; the senses remarkably acute; the general sensibility and muscular irritability much heightened; the organic actions readily influenced by the slightest external agents\*; and the circulating fluids thin, watery, and deficient in albuminous constituents and red globules, and in quantity. Facts illustrative of this occurrence are adduced in the article on anæmia, which is thereby produced. (See BLOOD, *Deficiency of*, § 41.) The physical and mental debility resulting from confinement in dungeons and dark cells is to be attributed to the exclusion of light, restricted diet, want of exercise and of free air, and to moral causes combining with these in depressing the vital powers, and ultimately producing disease of a low and dangerous form.—(d) Intimately con-

\* The remarkable and authentic history of CASPER HAUSER, by the President VON FEUERBUCH, furnishes striking illustrations of the above. The accounts which have been recently published of this person should be attentively perused by every pathologist and philosopher, as being most singular and instructive. Casper Hauser was kept, from infancy until he was eighteen years of age, in a perfectly dark cage, without leaving it; and where he neither saw a living creature, nor heard the voice of man. He was restricted from using his limbs, his voice, his hands, or senses; and his food consisted of bread and water only, which he found placed by him when wakening from sleep. When exposed in Nuremberg, in 1828, he was consequently, at eighteen years, as if just come into the world; and as incapable of walking, discerning objects, or conveying his impressions, as a newly born infant. These faculties he, however, soon acquired; and he was placed under an able instructor, who has recorded his history. Darkness had been to him twilight. The light of day at first was insupportable, inflamed his eyes, and brought on spasms. Substances, the odour of which could not be perceived by others, produced severe effects in him. The smell of a glass of wine, even at a distance, occasioned headach; of fresh meat, sickness, &c.; and of flowers, painful sensations. Passing by a churchyard with Dr. DAUMER, the smell of the dead bodies, although altogether imperceptible to Dr. D., affected him so powerfully as to occasion shudderings, followed by feverish heat, terminating in a violent perspiration. He retained a great aversion, owing to their disagreeable taste and smell, to all kinds of food excepting bread and water. When the north pole of a small magnet was held towards him, he described a drawing sensation proceeding outwards from the epigastrium, and as if a current of air went from him. The south pole affected him less; and he said it blew upon him. Professors DAUMER and HERRMANN made several experiments of this kind, and calculated to deceive him; and, even although the magnet was held at a considerable distance from him, his feelings always told him very correctly. These experiments always occasioned perspiration, and a feeling of indisposition. He could detect metals placed under oil-cloths, paper, &c., by the sensations they occasioned. He described these sensations as a drawing, accompanied with a chill, which ascended, according to the metal, more or less up the arm; and were attended with other distinctive feelings, the veins of the hand exposed to the metal becoming visibly swollen. The variety and multitude of objects which at once came rushing upon his attention when he thus suddenly came into existence—the unaccustomed impressions of light, free air, and of sense—and his anxiety to comprehend them—were too much for his weak frame and acute senses: he became dejected and enfeebled, and his nervous system morbidly elevated. He was subject to spasms and tremors; so that a partial exclusion from external excitements became for a time requisite. After he had learned regularly to eat meat, his mental activity was diminished: his eyes lost their brilliancy and expression; the intense application and activity of his mind gave way to absence and indifference; and the quickness of apprehension became diminished. Whether this change proceeded from the change of diet, or from the painful excess of excitement which preceded it, may be questioned. My limits admit not of my adding more. The whole account is most important—the more so, as the physiological facts stated in it may be relied on.



nected with this cause and its effects, is the *privation of fresh air and exercise*. When muscular action cannot be performed under favourable circumstances, particularly as respects the requisite renewal of air, the circulation languishes, and suffers deterioration; the development of the locomotive organs is either impeded or prevented, and they are no longer in a fit state for the execution of the acts of volition. By a want, also, of a requisite *renewal of air*, the stimulating constituent of it becomes diminished, and replaced by directly sedative gases, and by vapours loaded with the effluvia of the system that respire it, or of those which may respire it in the same place; the extent of the stagnation or confinement of air, and of the causes of deterioration, proportionately heightening and accelerating the depressing effects thereby produced upon the frame.—(e) It is extremely probable, that whatever, in its passage through the digestive canal, or circulation through the body, *abstracts oxygen from the system*, will be also, to a certain extent, a cause of debility, as supposed by HUMBOLDT. The causes of scurvy may be partly of this description; as well as those of several other diseases.—(f) A not uncommon cause of depressed vital power is *the young sleeping with the aged*. This fact, however explained, has been long remarked, and is well known to every unprejudiced observer. But it has been most unaccountably overlooked in medicine. I have, on several occasions, met with the counterpart of the following case:—I was, a few years since, consulted about a pale, sickly, and thin boy of about five or six years of age. He appeared to have no specific ailment; but there was a slow and remarkable decline of flesh and strength, and of the energy of all the functions—what his mother very aptly termed a gradual blight. After enquiry into the history of the case, it came out that he had been a very robust and plethoric child up to his third year, when his grandmother, a very aged person, took him to sleep with her; that he soon afterwards lost his good looks; and that he had continued to decline progressively ever since, notwithstanding medical treatment. I directed him to sleep apart from his aged parent; and prescribed gentle tonics, change of air, &c. The recovery was rapid. But it is not in children only that debility is induced by this mode of abstracting vital power. Young females married to very old men suffer in a similar manner, although seldom to so great an extent; and instances have come to my knowledge, where they have suspected the cause of their debilitated state. These facts are often well known to the aged themselves, who consider the indulgence favourable to longevity, and thereby often illustrate the selfishness which, in some persons, increases with their years.—(g) It is extremely possible that whatever *conducts the electricity* of the body from it, will occasion direct debility. With this view I have long been in the habit of causing females who used steel supports to their stays, to lay them altogether aside. The experiments on CASPER HAUSER confirm this supposition.—(h) Intimately related to the causes consisting of abstraction of requisite stimuli, and to the effects resulting therefrom, seem to be the privation of those excitants to which the frame has been long habituated; although these,

as well as their effects, may be considered as falling more strictly under a different section of this subject. The privation, by whatever cause, of those states of electrical tension which exist in healthy conditions of the body, and fright, or prolonged fear, may also occasion primary debility.

7. C. But the vital power is enfeebled by another class of causes—by agents which seem *directly* to depress it below its healthy standard. These agents have been called *contra-stimulants* by the Italian physicians of the school of RASORI.—(a) Several of those, however, when employed in sufficiently small quantities, actually excite the parts to which they are applied; and it is only when they are used in large doses that an opposite effect—violent depression and even annihilation of life—is produced. A minute quantity of prussic acid, or of tobacco, excites the organic functions; a large quantity instantly destroys life: and the remark applies, to a certain extent, to nearly all the more energetic narcotics; although many of them, as well as several other agents, whilst they depress the vital manifestations generally, also excite or irritate particular organs or tissues. Tartar emetic, acetate of lead, oxalic acid, colchicum, stramonium, belladonna, &c. furnish illustrations of this fact.—(b) The primary effects of *terrestrial effluvia* or malaria, and of the *infectious emanations* proceeding from the diseased, as from those affected by plague, yellow fever, typhus, and pestilential cholera, are evidently most acutely debilitating, even although these causes may also, and at the same time, act by irritating certain organs or tissues.—(c) Various mental emotions are also very powerful depriments of vital power, such as *fear, anxiety, grief*, longings after objects of affection, *nostalgia*, &c., particularly if they be of long continuance: they retard all the organic functions, and at last wither the whole organisation.—(d) Whatever impedes respiration, owing to the effects of this function upon the circulation, and on the blood itself, and consecutively upon the organic and cerebro-spinal nervous systems, also depresses the vital power in a very remarkable manner. Among the causes of primary debility, Dr. GEDDINGS has included *anæmia*. There can be no doubt of the existence of debility, when the blood is deficient or impure; but, instead of being the cause, anæmia is the effect of debility.

8. ii. CONSECUTIVE OR SECONDARY DEBILITY may arise in two ways: (a) from increased excitation of an organ, occasioning proportionate diminution of the energy of others—Sympathetic debility, or Debility from an irregular distribution of the vital endowment; and (b) from the exhaustion occasioned by previous excitement.—A. *Sympathetic Debility* (*Debilitas Spuria*, HUFELAND; *Metastatic Debility*, Dr. GEDDINGS). When it is considered that the organic or ganglionic nerves alone supply the blood-vessels, and the secreting organs and surfaces; that they communicate very freely with each other, and with their chief centre, the semilunar ganglion; that they are formed into numerous plexuses, rendering thereby the connection between them still more close; and that they are intimately related to the cerebro-spinal system, through the medium of communicating nerves; the mutual dependence of action between



the various organs of the body may be easily explained. If, moreover, it be granted, as I have endeavoured to prove in another work, that the most important vital phenomena,—as digestion, assimilation, circulation, secretion, animal heat, generation, &c.—in short, that life itself, with all those manifestations of it now particularised, and which have usually been called organic—result from the influence exerted by the ganglial nervous system, through the instrumentality of the vessels and structures, upon the circulating fluid they contain, and reciprocally by this fluid upon the nerves ramified in the parietes of the vessels, and upon the ganglia themselves, through which it must necessarily circulate,—the agency of this system in the production of the numerous phenomena of debility must be evident. From this view of the subject, and taking into account the various functions of dissimilar textures, and, under certain circumstances, the combined influence and reaction of the cerebro-spinal system and sensorium, the numerous relations of disordered actions, as respects the manifestations not merely of debility, but of disease generally, may be more satisfactorily traced.

9. When one organ or general system is simply excited, without being otherwise diseased, the functions of other organs, with which it is more or less intimately related by means of the ganglial nerves, undergo a relative degree of change; for as we exalt the vital manifestations in one or more parts of the series, we diminish them in equal proportion throughout the remainder. These views were first stated in the *London Medical Repository*, for May, 1822, and fully illustrated in my *Physiological Notes*, published in 1824; and have since been adopted by BOISSEAU and GEDDINGS. A due application of them is of the utmost importance in pathology and therapeutics, as well as in ascertaining a large proportion of the forms of debility, particularly those presented to us in the course of many acute and chronic diseases: thus irritation of the mucous surface of the stomach or bowels enfeebles the rest of the frame; and inordinate excitation of any other secreting organ diminishes the nutritive and animal functions in an equal degree, and so on as respects various other viscera and structures, as more fully explained when describing the states of vital energy connected with the nature of disease. (See art. DISEASE.)

10. B. *The Debility of Exhaustion*, or from excitement of a part, or of the body generally (*Indirect Debility*, of BROWN).—This form of debility arises from all agents, mental or physical, which excite the actions of a part, or of the system, above its normal state. Many of these causes act with great rapidity and intensity, others very slowly and insidiously; and whilst some simply change the *grade* of vital action, others seem to alter it in *kind*. Their effects vary remarkably with the susceptibility of the organ and constitution on which they act, and the frequency of their repetition; each successive application being generally less efficient than the preceding, if it be delayed until the action of the previous one has terminated. The circumstance of stimuli being productive of exhaustion, or indirect depression of vital power, to as great extent below the standard of health, as the previous excitement rises above it, as fully shown

by BROWN, DARWIN, and RUSH; and that stimuli must be repeated in larger quantity to produce the same effects, although presenting certain exceptions, are important facts as respects this pathological condition in particular, and disease in general: as long, also, as the repetition of the stimulus follows so quickly and regularly as to anticipate the appearance of the consecutive debility, the unavoidable consequences of its abstraction will not appear, at least for a very long time. But they ultimately will supervene in a most severe, and often dangerous, form, when such an event takes place; and if it does not occur soon, the prolonged excitement will ultimately terminate in organic change. Drunkards and opium-eaters often furnish proofs of the latter fact; and persons who indulge in an occasional debauch only, or who undergo great physical or mental exertions, feel the truth of the preceding positions. There is one cause, however, which requires to be particularised on account of its mode of operation and consequences: this is excessive sexual indulgence. It occasions a loss of vital power through the medium of the discharges, independently of the exhaustion consequent upon the previous nervous excitement. Its depressing effects are, moreover, experienced by all the organs, but especially in the ganglial and cerebro-spinal nervous systems; and are often followed by the most serious results in both male and female.

11. iii. COMPLICATED DEBILITY.—I have contended, in the article DISEASE, that the vital manifestations of an organ, or of the frame generally, may be modified, not only in *grade*, but also in *kind*. If this be admitted, it follows that debility, originating in either of the ways now shown, may be either *simple*, or *associated* with an otherwise morbid state of vital action. Upon a review of practical facts, we shall find that the more simple states of debility most frequently occur either primarily—especially from agents abstracting vital power—or indirectly, from causes which over-excite the nervous influence, or which abstract as well as exhaust vital power; such as the one last ad-duced. But the condition now under consideration is more generally the result of causes which either irritate in a slow and continued manner some particular tissue or viscus, or modify the sensibility of an organ, or change its secreting or nutritive actions, or even vitiate the condition of the circulating fluids. Whilst the preceding forms of debility are mostly met with in the commencement of diseases, or constitute the early stages of those ailments consisting almost entirely of simple asthenia, but, which are often mistaken for structural maladies, this condition is observed chiefly in the progress, or towards the close, of many acute and chronic complaints, some of which are of a specific or malignant character; and it may arise out of either of the foregoing varieties of debility, especially when much prolonged. That which becomes so remarkable in the course of typhus, or yellow fever, of plague, or of syphilis, cancer, scrofula, &c., consists not of a simple depression or exhaustion of vital power merely; for this power is also specifically modified even from the commencement of these diseases;—the sensibility and organic contractility are changed; the secretions and nutrition are interrupted, or much affected; and although the debility may be the same as to grade in several



or all of them at certain of their stages, yet is the vital endowment otherwise modified in each, and in such a manner as to present specific characters whereby they may be severally known and distinguished, without taking the grade of vital manifestations into the account. It is this form of debility which may be imputed to what has been called, in general terms, by BRERA, the evolution of matters injurious to life: and it very often arises from causes, which, by the nature of their impression upon the living frame, not merely depress, but also otherwise vitiate, the conditions of life in all the systems and organs of the body, as shown by the effects produced by the morbid effluvia of typhus, yellow fever, and other malignant diseases.

12. II. THE SPECIAL MANIFESTATIONS AND EFFECTS OF DEBILITY.—I have hitherto been considering asthenia in its *general conditions*; I have now to view it in its *specific* or *partial states*. In doing this, I shall only attempt an imperfect outline of its relations to the principal general systems and organs of the body, and endeavour to show that one or more of them may manifest this state in a greater degree than the rest, or in a modified form; and that in this manner much of the varied phenomena of disease may arise; but that neither of them can experience it to a great extent, or for a long time, without either a similar state of disease extending more generally, or some other morbid condition springing out of it,—consequences which must necessarily result from the intimate union of the different organs by the organic nervous and vascular systems, as well as from the mutual dependence of their functions, and the reciprocity of vital influence.

13. i. *Debility of the general Systems*.—A. The close connection of the *organic* or *ganglial nervous system* with the manifestations of life has been in several places insisted upon; and conformably with this opinion, and with intimate views of the origin and nature of morbid actions, debility cannot exist in a marked degree without this system, being primarily affected. But of the extent of this affection we can form no estimate, excepting from the effects upon the functions of those organs which it influences. I have long considered, and on various occasions endeavoured to show, that the ganglial and the vascular systems, by their resulting and reciprocal actions, are the factors of life; and that the part which the former consequently and necessarily performs in the causation and removal of morbid phenomena is most immediate and important. If we examine closely the manner in which causes invade the frame, we shall find, a great proportion of those which produce any of the states of vital depression already noticed, make their impression in such a manner as to leave no doubt of their action being primarily exerted upon this system, thereby proving its very close connection with life. It is, however, evident that the impression made in this quarter will not remain for any time limited to it; but will extend in the first instance to those parts which are most intimately associated with it, and dependent upon it for the regular performance of their functions. This *à priori* inference is actually demonstrated by observation; for we find the circulating, the digestive, and the assimilative functions, immediately enfeebled by causes which can operate in no other way, and through no other channel than the nervous system of organic life.

Such of those causes as are of an intense kind, and are most injurious to life,—which modify while they depress its manifestations,—have their impression rapidly propagated throughout this system, and to the structures and organs which it actuates; whilst those of a slighter kind, or slower operation, may exert their effects in parts of it only, or chiefly, and more or less partially in other viscera. Viewing this system, therefore, as that upon which the greater number of causes depressing the vital manifestations first exert their action, and consequently as the point whence the depressing effects proceed, I shall briefly consider these effects in each of the principal functions, organs, and structures.

14. B. *The circulating systems and fluids* are affected according to the intensity of the depressing causes relatively to the energy of the system at the time; and the ultimate results vary with the successive changes that supervene in it, and the associated nervous systems, and secreting and eliminating organs.—(a) In simple debility, the heart's action is languid, or slow; but readily excited by stimuli. If the debility be chronic, the parietes of its cavities may ultimately become wasted or thinned; or even softened, and the cavities themselves dilated. In the advanced stages of acute or complicated debility, the heart's action is generally very quick, soft, weak, small, and unequal or irregular; and in chronic cases, its substance softened, flaccid, or even dilated.—(b) The arterial vessels lose some portion of their tone; but, excepting in as far as they convey the impulse of the heart on the blood, they are not otherwise affected until debility arrives at an advanced stage, or is acute or complicated. When this occurs, arterial action may even become very much increased, particularly as respects the frequency of the pulsation communicated by the heart's contractions, whilst the vital power of the system generally is remarkably depressed. In such cases, the pulsations are broad, open, quick, and very easily compressed; or they are small, weak, soft, and thready. Acute and complicated debility, thus presenting the apparent incongruity of great depression of vital power, with morbidly excited vascular action, is not infrequently observed in the advanced stages of those diseases in which the circulating fluid becomes contaminated by injurious matters introduced into it from without, or generated in it, in the manner explained in the article BLOOD (§ 110—144.). In these, although the general manifestations of life are enfeebled to the utmost, yet the action of the heart and arterial system is excited by the irritation produced by the contaminated blood circulating through them, and the low grade of vitality still existing is thereby soon exhausted.—(c) The manifestations of debility on the blood itself,—in occasioning *plethora* when the vital depression is so slight as not to diminish digestion and assimilation,—in favouring irregular distributions, or *determination of blood*, in its more chronic states,—in producing *anæmia*, when its grade is still lower, or when it is more prolonged, and the assimilative functions, especially affected,—and in giving rise to *contamination* of this fluid, when it impedes the secreting, eliminating, or excreting functions,—will be found discussed in that article.—(d) Debility seldom exists long, or in a marked form,



without the *venous* circulation becoming thereby affected. The depressing agents, indeed, which act most severely upon the frame, give rise to impeded circulation or congestions of blood through the veins as one of their more immediate effects upon the economy, as shown in the article CONGESTION OF BLOOD.—(e) The *lymphatic* and *absorbent vessels* even escape not the consequences of debility, particularly when it arises from original conformation, or deficient and unwholesome food. This is shown by scrofulous diseases of the glands, in the mesenteric consumption of children, and some states of dropsy. (See LYMPHATIC SYSTEM.)

15. ii. *Debility of the Functions of associated Organs.*—The functions about to be particularised are depressed by, (a) Causes which lower the vital actions of the foregoing systems in a general and severe manner; and (b) by such as operate immediately upon these organs themselves. The former, being more general, and more intense in their operation, are immediately followed by arrest, or remarkable disturbance, of the functions in question; whilst the latter causes usually, but not always, over-excite and thereby exhaust these functions, and, by the frequency of their repetition rather than by their intensity, produce their effects more slowly and partially. A. *The digestive and secreting organs* are amongst the first to experience debility, however induced. This may arise from the evident dependence of their functions upon the ganglial system of nerves. But they may be especially affected, and may continue so for some time, without other parts of the frame evincing much disorder, particularly when the debility has been slowly and indirectly produced. The more special manifestations of debility in the *stomach*, the *liver*, the *duodenum*, and *bowels*, usually begin in this way; and they have severally obtained, according to the forms they assume, the names of indigestion, torpor of the liver, flatulence, constipation, colic, &c.—these being the more common effects, although several others may be adduced. When debility, either of an acute or chronic form, affects chiefly the digestive organs, the abdominal *secretions and excretions* are more or less disordered—are usually in smaller quantity and vitiated quality. But this is not the only result; they are generally retained on the surfaces and situations where they are secreted, until they undergo various changes, and acquire irritating properties. This is well illustrated by many of the functional diseases of the *liver*, and *bowels*. (See CÆCUM, COLON, CONCRETIONS, CONSTIPATION, LIVER, WORMS, &c.)

16. B. *The respiratory and assimilating functions* manifest debility in various ways; the respiratory by frequency, shortness and quickness of action, and diminution of the changes usually produced upon the blood and air respired; the assimilating function by the thin and watery state of the blood, by the deficiency of its quantity, or of its red particles, as in *anæmia*, and, in slighter cases, by the milky or oleaginous condition of the serum. When debility is slight or recent, or when it has been gradually induced by stimulating agents, *nutrition* is not very materially affected; it may even be partially increased, owing to impeded or imperfect secretion and assimilation, the consequent abundance of

fatty matter in the circulation, and its deposition in the adipose structure, thereby increasing the bulk of the body. But when the vital energies are more remarkably depressed, either in acute, chronic, or complicated cases, the nutrition of all the structures and organs, particularly of adipose, cellular, and muscular parts, is more or less arrested.

17. C. *The vital manifestations of the cerebro-spinal nervous system, and organs of sense*, may be remarkably enfeebled, without the rest of the frame being materially affected: but they may also be uncommonly active, although all the other functions of the body are debilitated. *Idiotcy* and certain states of *insanity* are often met with unconnected with any marked depression of the physical powers; and, on the other hand, particularly in chronic debility attended by emaciation and quickened circulation, the powers of mind are frequently very acute. The slightest change in the freedom, activity, or quickness of the circulation in the brain and spinal chord, and in the purity of the blood, will materially affect the character of the phenomena associated with debility of these organs, or of the body generally. As long as the circulation is unimpeded, and the blood sufficiently purified by the emunctories, debility will be attended by great activity of all the senses, and increased irritability of all the muscles. Hence arise various of its forms, familiar to every observer of disease,—that *with increased sensibility* (the *Debilitas ad Sensum* of some writers), and that *with augmented irritability* (the *Irritable Debility* of HUFELAND and other German authors,—the “*Mobility*” of Dr. CULLEN); both which forms constitute increased susceptibility, or excitability, of the cerebro-spinal system, and of the organs they influence. When, however, retarded circulation occurs in this system, or if the blood itself be rendered inappropriate to its state and functions, by the superabundance of unassimilated materials, or if it be insufficiently purified by the emunctories, debility, whether thus limited or universal, will be attended by a proportionate degree of *torpor* (the *Torpid Debility* of HUFELAND), as well as by *adynamia* of all the organs dependent upon this system; instances of which are sufficiently common in many acute diseases. In this way the various manifestations of debility in the mental faculties, the general sensibility, and the mobility of the frame, in different cases and complications of disease, may be explained,—particularly if the various organic changes which so often supervene or become associated with this state of vital power, and with either of the conditions of the cerebral and general circulation now alluded to, be called into aid. The *causes* also, the nature of their impression, and their mode of operation, will remarkably modify the state and duration of cerebral asthenia. These are chiefly, (a) Such as act immediately on this system,—as inordinate mental exertions, the depressing passions and emotions, excessive fatigue, and narcotic poisons. (b) Those which act indirectly or mediately,—as the intense or prolonged impression of cold on the surfaces, terrestrial and infectious miasms, the actions of various sedative or contra-stimulant agents, and the abuse of the sexual organs; all which occasion modified or even different effects. The *organs of sense*, as



well as other parts immediately controlled by the cerebro-spinal system, have their functions enfeebled and impaired in proportion to the debility it experiences. But they may also be individually affected, and in various degrees, without this system being materially disordered. Such occurrences generally arise from the operation of local causes,—as over-excitement of the organ, and exhaustion of its sensibility by its peculiar stimuli; as weakness or loss of sight from over-exertion, or the intense or prolonged action of light; and loss of hearing from great noises, &c.

18. *D. The muscular structures*, from their connection with the ganglial and cerebro-spinal systems, necessarily experience the effects of depression of the energies of these systems, varying, according to its acute and chronic form, its degree, its simple or complicated state, and the progress it has made. But debility seldom originates in, or is limited to, these structures. Its earliest and simplest manifestations in them are diminished tone, flaccidity, wasting, particularly of voluntary muscles; lowered, or, in some cases, morbidly increased irritability, according as the nervous systems experience a diminution or increase of their susceptibility (§ 17.); occasioning, in some cases, irregular and tremulous motions, and a disposition to spasmodic or convulsive action, but more frequently defective energy of contraction, or power of continuing and repeating it, in both the involuntary and voluntary classes of muscles. In the more acute, or the more advanced and complicated states of adynamia, the insensible tonic contractility of muscular fibres are in a great measure lost; their vital cohesion is also so much diminished as to admit of their being more easily torn; they are incapable of performing even a portion of their functions; and their contractions are feeble, vibratory, or oscillating, productive of the utmost fatigue, sometimes of death; and the least exertion, even that requisite to preserve the body recumbent upon one side, cannot be sustained for a few minutes. These extreme states of debility occur in the most dangerous and severe cases of disease, as in adynamic fevers, scurvy, &c., and when the circulating and secreted fluids have become sensibly changed from their healthy condition.

19. *E. The sexual organs*, whilst they participate in the vital depression of the general systems, are often themselves chiefly affected. It is by no means uncommon to meet with instances, particularly in the male sex, of the most complete debility of these organs, amounting sometimes to entire loss of function, from precocious and inordinate excitement and indulgence; there being little or no other disorder, excepting enfeebled mental manifestation, in some cases. In others, however, all the organic and cerebro-spinal functions have become remarkably weakened, although not to the extent experienced by the organs in question. (See IMPOTENCY.)

20. *iii. The Manifestations of Debility in particular Tissues* are less evident than in the general systems and associated organs; and they are later in becoming evident. It is usually not until they are extreme, long-continued, or complicated, that they are remarkable.—(*a*) The *cellular tissue* at first evinces deficient firmness and elas-

ticity, with softness, and, as debility increases, loss of its vital cohesion: it at last presents a tendency to oedematous or serous infiltration, and even to hæmorrhage, owing to weakness of the extreme vessels terminating and originating in it, and the insufficient support it yields them. When it is thus changed, the spread of other diseases through it is thereby remarkably promoted, and an unfavourable termination hastened,—as in cases of diffusive inflammation, erysipelas, punctured or poisoned wounds, &c.; its vessels having lost their power to limit the extension of inflammation by forming coagulable lymph.—(*b*) *Mucous membranes* are amongst the earliest of the particular tissues to experience the effects of debility, thereby increasing and perpetuating many of its phenomena. At first their functions merely are impeded; their secretions either diminished, or imperfectly excreted, or increased from relaxation of their vessels, or in other respects vitiated. As debility, whether of them especially, or of the frame in general, advances, vital cohesion becomes impaired, and they yield not the requisite support to their vessels; whence result softening, hæmorrhage from their surface, ecchymosis, asthenic ulceration, atrophy, &c.—(*c*) The *serous tissues* undergo a partial diminution of their cohesion, and permit an aqueous or serous fluid, in some extreme cases tinged with blood, to escape through their exhaling pores.—(*d*) The *erectile textures* at first evince greater susceptibility, particularly when debility has been induced by inordinate excitement of the sexual organs; but as it increases, they lose their peculiar functions.—(*e*) The *fibrous tissue* also experiences relaxation, becomes less elastic, and more readily yields than in health, giving rise to almost spontaneous dislocations,—results which have occurred in the chronic debility caused by masturbation, as remarked by Sir ASTLEY COOPER and Mr. COPLAND HUTCHISON, and by myself in one case.—(*f*) The *osseous texture* occasionally experiences, in children, an imperfect deposition of ossific matter, or even absorption of a great part of that already secreted; and, in aged persons, the removal of the animal matter which gives due cohesion to this structure: and, (*g*) The *corneous tissues* are often variously changed; the hair either falling out, or becoming thin, weak, or grey; the epidermis inclined to exfoliate, and rough or scaly; and the nails thin, long, crooked, or irregular.

21. *III. DEBILITY OF THE WHOLE FRAME.*—Debility seems, as already stated, most frequently to originate in the ganglial and vascular systems, which I have viewed as the chief factors of life; the digestive, assimilative, excretory, and cerebro-spinal organs being subsequently affected. But it may also commence in, and continue for a considerable time limited to, either of these, or even, although rarely, to one or more of the individual tissues. When existing thus locally, it usually springs from local and indirect causes, and is at first of a slight grade, the functions of the part merely being impeded; but, as it continues, the rest of the economy becomes implicated in various degrees, owing to the reciprocity of vital action and function existing throughout the frame. With this universal diffusion of asthenia, the part primarily disordered may still continue affected in a greater degree, exhibiting the changes of func-



tion, and even of structure, now briefly sketched in respect of the principal systems, organs, and tissues, according as they may be implicated; but, in many instances, the debility becomes co-ordinate throughout; and in rare cases, the part originally affected even partially recovers its powers upon some other organ having its vital energies more remarkably depressed.

22. IV. CHARACTERISTIC SIGNS, &c. — When asthenia is thus general and fully developed, the external aspect of the body, and all the vital functions, are affected; the extent and specific characters of ailment furnishing important pathological as well as therapeutical indications to the practitioner: — The countenance is pale, thin, or collapsed, sometimes bloated and discoloured: the eyes lose their animation, and sink in the sockets, and they are surrounded either by a dark or bluish, or by a tumid and œdematous, circle; the expression of the features is languid and depressed; the lips are pale; the tongue watery, moist, soft, broad, and sometimes tremulous, and the papillæ depressed and wasted; the voice and speech are weak, or nearly lost; the voluntary muscles lose their powers, and hence, in extreme cases, the continued supine posture, the inability to retain a position on either side, the sinking down in bed, and the falling of the head on the breast or on either shoulder. The surface of the body has its temperature diminished, is sometimes partially covered with a cold or clammy perspiration, becomes soft and flabby, occasionally of a more lurid or dirty hue, or pale and waxy, particularly in complicated debility; the firmness and elasticity of the soft solids are lost, and they either present a leucophlegmatic appearance, or they are remarkably emaciated, — the latter being particularly the case when the circulation is accelerated. The functions of the stomach and bowels are impaired, or altogether suppressed; and hence the want of appetite, the constipation, and emaciation, — which last affects first the adipose tissue, and next the cellular and least vitalised structures. When the depression is very great, the vital attraction requisite to the nutrition and healthy cohesion, especially of the more remote and superficial parts, being necessarily diminished, the function of absorption gains the ascendancy; and the less perfectly animalised constituents, particularly the adipose substance and the effete elements, are carried back into the circulation; and thus, in some states of disease, the body continues to live upon itself, until the functions are restored, or life extinguished; the external soft solids, attached to, or covering, the bones, meanwhile becoming remarkably attenuated. In general, the pulse is frequent, soft, small, and easily compressed; the action of the heart is weak, and leipothymia or syncope occur upon exertion, or on quickly assuming the erect posture. Respiration is frequent, imperfect, or anxious or difficult, and the motions of the thorax are slight and confined. The functions of the cerebro-spinal system are more or less enfeebled; and, with the changes described above (§ 17.) present the following phenomena: — Loss of memory; inability to prosecute a lengthened chain of discussion, or to fix the attention long on one subject; sometimes weakness, with hebétude of all the faculties; an unpleasant feeling of languor, and exhaustion, with a sense of anxiety referrible to the præcordia and pit of the stomach; vertigo or

headach; noises in the ears, either with or without impaired hearing; weakness of the limbs, and relaxation of the ligaments of the joints, with tremors, occasionally convulsive movements, or local paralysis; and ultimately low or quiet delirium.

23. V. DIAGNOSIS. — A distinction has usually been made between *real* and *spurious debility*. The latter term, however, implies a contradiction. But as it is the morbid condition, and not the name imposed upon it, that requires notice, I may briefly allude to it. The state of system, to which this name has been applied, would be better expressed by denominating it *oppression of vital power*; this, or nearly similar appellations ("*oppressio virium*," "*debilitas ab oppressione*"), having been employed by several modern pathologists. The vital manifestations may be generally or partially *oppressed* by whatever impedes their free reaction in removing the impression produced by injurious agents, or by whatever arrests the function of an important secreting organ or vital emunctory, whereby the vascular system becomes overloaded, and consequently oppressed throughout, as well as in the organ whose functions have been interrupted. The distinction will be more easily understood by a reference to facts. — During pneumonia, the lungs perform their functions in respect of the blood imperfectly, and the various secretions and excretions are diminished. Hence the quantity of the circulating fluid is increased; the circulation through the inflamed lung rendered difficult; the functions of this organ impeded, and the vessels generally distended beyond their power of reaction upon their contents, so as to restore the suspended functions. In such cases, the pulse is suppressed, and not much accelerated; but it conveys the sensation of a confined limit of pulsation, thereby suggesting the idea of a sustained state either of tonicness which the systole of the ventricle cannot much affect, or of distension upon which the elasticity of the vessel reacts imperfectly in the intermissions between the systoles. That this state actually obtains, is shown by the effects of blood-letting in changing the character of the pulse, in removing the feeling of oppression, and in partly restoring the strength. Inflammations of other organs — as the liver, brain, &c. — also furnish instances of oppression of vital power. In all these, however, the state of the surface of the body, and other symptoms above noticed as characterising true debility (§ 22.), do not exist. In fevers, also, the reaction following the impression of the exciting causes is very generally attended by oppression of the powers of life, owing, in some cases, to an overloaded state of the circulation from interrupted secretion, &c.; and, in other cases, partly to this circumstance, and partly to the depressing influence produced by these causes still continuing, and, jointly with the increase in the quantity of the circulating fluid, favouring congestion of internal secreting and vital organs. Hence, in several forms of these diseases, a complicated pathological state is the result; viz. *depressed*, followed by *oppressed*, vital power, as soon as attempts at reaction begin to be made, in order to overcome the injurious impressions and changes occasioned by the exciting causes. This suppression of power may arise out of true



debility, may be associated with it, and terminate in it, in its worst and complicated states.

24. The DURATION of debility is extremely various. It may, particularly when acquired and slight, be remarkably long, or continue through life, which it may not even abridge. When rapidly and *primarily* produced, or general and intense, or complicated, it is usually *acute* as respects its continuance; but when *consecutive*, or partial, or the result of irritation of particular textures, it is prolonged into the *chronic* state; its duration depending greatly upon its degree, and both being extremely various.

25. VI. PATHOLOGICAL RELATIONS.—i. The CONSEQUENCES AND TERMINATIONS of debility are, (a) Impeded or interrupted secretion; (b) Changes of the circulating fluids; (c) Various states of irritation, or inflammatory action, in particular organs or tissues; (d) General reaction of the vascular system, associated with various grades of vital power, from the lowest, or most asthenic, to its highest, or most sthenic form, with their modifications; (e) Changes in the firmness, elasticity, nutrition, colour, form, and vital cohesion of the soft solids, and, in some instances, ultimately in the hard solids also; (f) Effusions of fluids (aqueous, serous, sanguineous, &c.) from mucous or serous surfaces, or in cellular or parenchymatous structures; (g) The production of numerous forms of organic change; (h) The formation of new or adventitious tissues or productions, as tubercles, tumours, melanosis, cancer, hydatids, worms, gangrene, &c.; and, (i) lastly, Death, which may occur directly from the intense action of the depressing cause, but more commonly through the medium of one or more of the changes now enumerated, the first and greater part of which often taking place consecutively.

26. ii. ASSOCIATIONS OF DEBILITY.—Asthenia is very frequently connected with some other morbid condition, implicating either particular parts, or the system generally. Amongst these are the *consequences* now enumerated (§ 25.); but the most important are, (a) The association of depressed with otherwise modified or morbid states of the vitality of the system; (b) with a vitiated condition of the blood and secreted fluids, either or both of which constitute the complicated debility already mentioned (§ 11.); (c) with a disposition to solution of the textures generally, or of a part merely, as in malignant fevers; (d) with congestions, and chronic or acute inflammations of particular organs or structures, as in complicated forms of fever, erysipelas, diffusive inflammations, dysentery, &c.; (e) with intestinal worms, hydatids, and various malignant and adventitious formations.

27. A knowledge of the pathological relations of this most important and singularly overlooked condition of vital power is necessary to the practitioner, inasmuch as it enables him to entertain enlarged and connected views of disease, by the aid of which he may the better comprehend such states of disordered action as cannot be readily assigned to any particular type or specific form, owing to their imperfectly marked characters, the associated disturbance of different organs and structures, and the want of prominent symptoms whereby they may be ascertained. Debility not only constitutes, in its more intense forms, dis-

ease itself, and a most serious part of many of the most dangerous maladies, but it also *predisposes* the body to be affected by the numerous injurious agents to which it is constantly exposed.

28. iii. The PREDISPOSITION to be affected by the exciting causes of disease, arising out of debility, will necessarily vary with the form and grade it assumes, and the circumstances in which it has originated. This proposition is too evident to require illustration. But when the debility proceeds from irritation of one or more structures abstracting vital power from the rest (§ 9.), it may not increase, but may in some cases diminish, predisposition, particularly when it is attended by exalted sensibility and accelerated circulation. Thus the debility attending irritation in any part of the respiratory organs even diminishes the disposition to be affected by malaria, and infectious or epidemic agents. So much, however, of what constitutes liability to diseases is owing to the temperament, diathesis, the modes of life, and habit of body, as well as to general or local debility, that the exact share of each can rarely be ascertained. General debility either in its direct or primary form, or as consecutive of over-excitement, disposes the system to be affected by terrestrial emanations, vicissitudes of season and weather, and infectious effluvia. The more local or partial states of debility, particularly when existing in secreting organs and the associated structures, render them liable to congestions, inflammatory irritation, to disordered secretion and excretion, to spasmodic or convulsive movements, to effusions, to various states of inflammation, and organic change, with the other *consequences* and *associations* of debility above enumerated (§ 25, 26.), upon exposure to causes which disturb the *balance* of vital manifestation throughout the frame in a sudden or violent manner, or which impede the assimilating and depuratory functions, and thereby disorder the vascular actions and the circulating fluid. (See DISEASE—*Causes of*.)

29. VII. TREATMENT.—In attempting to remove debility, our means should be directed with a strict reference to its form, grade, and complication. These, however, are so numerous, that precise rules of treatment cannot be laid down; the only attempts of this kind that can be made, falling more appropriately under those diseases of which depressed vital power forms an essential part. (See especially the FIRST CLASS of the author's classification.) In the treatment of debility, in either its simple or associated states, there is a particular class of remedies, viz. *tonics*, which are more beneficial than any other; although many articles belonging to other classes, as diffusive stimulants and antispasmodics, may often be prescribed, and with great advantage. Tonics, which have derived their name from their influence in augmenting the tone of contractile parts, owe the principal part of their good effects to their elevating, in a gradual manner, depressed vital power, hardly up to, and seldom or never above, the healthy standard; and to the permanency of their action. By their repetition before the effects of the previous dose have subsided, the beneficial influence ultimately is propagated throughout; and as soon as one or more important functions are restored, the rest participate in the change, and the whole assume



a regular discharge of their offices, owing to the reciprocity of vital influence and function existing throughout the economy. Much, indeed, if not more, is also due to the partial absorption into the circulation of their active constituents; and to their direct action on the vessels, the different tissues, and on the blood itself. Although various diffusive stimulants and antispasmodics produce beneficial effects in several states of debility, yet they are generally much less serviceable than tonics, and in many instances are even injurious, chiefly from the quickness and little permanency of their action, from their proneness to over-excite and over-heat the system, and consequently to indirectly depress its energies. Hence, in order to perpetuate their restorative effects, it becomes requisite to repeat them more frequently; and thus a habit and desire of excitation is generated, which, if not gratified, is followed by insupportable exhaustion. However, in many states of disease, they are beneficial from the rapidity of their action, and are useful adjuncts to more appropriate means. As all the agents which restore the vital energies vary not only in the grade, the rapidity, and the permanency of their action, but also in respect of the organ, or the system, or tissue, on which their influence is chiefly exerted, it becomes a most important object in practice to ascertain the part primarily and chiefly affected, and to prescribe them according to our knowledge of their mode of operation.

30. Before adopting measures to remove debility, we should ascertain, 1st, The *causes* in which it has originated; 2dly, Whether or no it may not be apparent merely,—the consequence of *oppressed*, and not of *depressed*, vital power; 3dly, If it proceed or not from *irritation* of a particular part, abstracting the due energy from others; 3dly, Whether it be *simple* or *complicated*; and, 4thly, If it be *associated* with any local mischief or *change of structure*. Having ascertained these important points, the next object is the choice of agents, and appropriation of them to the states of debility presumed to exist. It is chiefly to the neglect of a pathological analysis, similar to the above, of the cases which occur in practice, that the abuse of tonics in diseases of debility is chiefly to be attributed.

31. i. *Primary Debility* should be treated, conformably with the injunction now given, with strict reference to its cause, to the particular form it has assumed, and the organs or parts chiefly affected. If it have arisen from abstraction of the stimuli necessary to health, these should be restored; if from depressing agents, whether physical or moral, these should be counteracted as far as may be.—(a) When debility is manifested more especially in the viscera immediately influenced by the *ganglial* and *vascular systems*, it very generally proceeds from one or other of these classes of causes; and, besides their removal or counteraction, requires, according to the rapidity and the intensity of their operation, the most carefully selected remedies. If the vital depression be rapidly progressive or very great, diffusive stimuli, as camphor, ammonia, the æthers, serpentaria, arnica, &c., will be requisite in the first instance, until it is arrested, when tonics will be more serviceable; but, with the first indication of reaction, stimuli of every

kind should be laid aside, lest the consequent excitement should be carried to an inordinate height by their means. The propriety of prescribing tonics appropriately to the states and grades of debility, as insisted on by HOFFMANN and THOMANN, cannot be doubted; but opinions will differ widely as to those which are more suitable to certain conditions. When the vital depression affects the action of the heart more particularly, after momentarily exciting the olfactory and respiratory nerves, as well as those of the stomach, by means of the volatile and diffusive stimulants, as the æthers, ammonia, and aromatic spirits, &c., the more permanent tonics should be employed. If there appear to be a deficiency of blood in cases of this description, the preparations of iron will be most serviceable, and will be advantageously combined with myrrh, cinchona, gentian, willow-bark, cascarrilla, and the sub-carbonate of potassa. If the organic nervous influence be depressed, without any manifest deficiency of blood, either of these vegetable tonics may be taken, with the fixed alkalies or their sub-carbonates, or with the mineral acids, according as it may be desirable to promote the secretions, or to impart tone to the extreme vessels. When we wish to excite the functions of the viscera generally, and particularly when the blood does not undergo the requisite changes as it circulates through the different assimilating and depuratory organs, the chlorates of potass and soda (the oxymuriates) will be found of much use. I have employed them for several years with much benefit, at the Infirmary for Children, in diseases of debility affecting chiefly these organs, as well as the preparations of iodine, especially the hydriodate of potass. The bitter tonics, combined with aperients, will also prove of great service in similar cases. The marked advantages of associating individual medicines from each of these two classes,—first made known to me by the writings of HOFFMANN, and confirmed by repeated observation,—are brought about both by their increasing the action of the secreting and excreting viscera when thus conjoined, and by their improving thereby the condition of the circulating fluids, as well as permanently exciting the vital influence. In some cases, the combination of small doses of the extract of nux vomica, or of strychnine, with aloes and myrrh, has proved equally beneficial. It was in pathological states similar to those now under consideration, that phosphorus was prescribed by CONRADT and others, that the inhalation of oxygen gas was strenuously advised by BEDDOES, and that electricity and galvanism were generally recommended by Continental writers. But I perfectly agree with GRAPENGEISSER, in viewing these as calculated to be injurious where there exists any increase of irritability, either locally or generally, or where any vital organ is congested.

32. When debility is the consequence of the injurious impression of some powerful agent, as terrestrial or infectious effluvia, it will often be most advantageous to interrupt the succession of morbid phenomena by the exhibition of the most active tonics in large doses, and in conjunction with warm cordials. All the more intense states of primary debility proceed from impressions



made by sedative causes upon the ganglial system, and may be removed by counter-agents directed to the same system, before consecutive changes have advanced far, or the functions of the emunctories and the state of the circulating fluid have been disordered to the extent of giving rise to the early phenomena of febrile reaction. Thus, the more stimulating emetics, immediately followed by powerful tonics, or cathartics preceded by or combined with warm tonics, will often prevent the accession of fevers, when exhibited before the cold stage, or rigor, has commenced; and, in some cases, although it have commenced, if it have not terminated in excitement. But, in these cases, the tonics and other excitants prescribed should be of such kind, and in such quantity, as will make a powerful impression on the nervous system of organic life, and as are calculated to restore the suspended secretions. The preparations of cinchona, or the sulphate of quinine, combined with the hot spices, as capsicum, or with camphor, or with ammonia, and prescribed in large doses after an emetic, and followed by a purgative conjoined with the same stimulants, are the most eligible in such cases. The preparations of arsenic, the sulphates of zinc and iron, piperine, the muriate of ammonia, the chlorates, and various other tonics, are also appropriate in cases of primary debility, especially when assisted by the cardiacs now mentioned; but they are less efficient than the foregoing in removing the vital depression primarily induced by the exciting causes of fevers.

33. When asthenia affects especially the capillary vessels, and the crisis of the blood is deficient, or when hæmorrhages take place unattended by vascular excitement, the more astringent tonics should be given with sulphuric acid; and if the loss of tone be excessive, these should be associated with cardiacs and aromatics, and alternated with moderate or full doses of the more energetic terebinthines, and balsams; morbid secretions being duly evacuated by the preparations of rhubarb.

34. (b) Debility manifested chiefly in the *associated organs of digestion*, can never be permanently removed, unless the secretions and excretions be duly promoted; and, for this purpose, the combination of tonics and aperients alluded to above is the most efficacious. But this practice should not be resorted to whilst irritation, or active congestion of, or determination of blood to, any of these viscera exists, lest we thereby convert such disorder into inflammatory action. In such circumstances, the more heating tonics, or those which contain most of resinous or oleaginous constituents, are the least appropriate. Where irritation of the digestive mucous surface is complicated with debility of these organs, mild tonic infusions may, notwithstanding, be exhibited with benefit, especially those of calumba, gentian, cinchona, quassia, &c.; and may be combined with acids, or with small or moderate doses of the nitrate of potass, or the sub-carbonates of potass or of soda, or with both the nitrate and sub-carbonate. It is chiefly in cases of this description that diffusive stimuli and heating tonics, so much and justly inveighed against by BROUSSAIS, ORTO, and PHILIPS, are injurious. When asthenia is associated with a somewhat lax state of the

bowels, not proceeding from inflammatory irritation of their mucous surface, muriate of lime, or cusparia, calumba, quassia, or cascarilla, with the alkaline sub-carbonates, &c., are generally of service. When the debility of these organs is attended by torpor of the liver, or accumulations of bile in the gall-bladder and hepatic ducts deobstruent purgatives should precede the exhibition of tonics and stomachics. If it be associated with *worms*, purgatives, and afterwards chalybeate tonics, are required.

35. ii. *Treatment of Consecutive or Secondary Debility.*—A. It will generally be found, when the debility arises from *irritation of some organ or secreting surface*, that tonics or stimulants, unless such as are mild, and contain but little of an essential oil or other heating constituents, combined with deobstruents and anodynes, will prove either of no service, or injurious, from favouring the supervention of inflammatory action and organic change. Similar effects are also apt to follow the exhibition of tonics, when debility is attended with congestion of some internal viscus, or obstruction of secreting organs: and they will seldom be of any benefit until these affections are in some measure removed; unless the powers of life are incapable of themselves of restoring the tone of the circulation and the suspended secretions, by developing a healthy reaction. In such cases, local depletions, and remedies calculated to excite secretion and excretion, should precede, or even in some instances accompany, the exhibition of gentle tonics, which ought to be prescribed in conjunction with deobstruents, assisted by change of air and a light nutritious and farinaceous diet.

36. B. The debility which follows *over-excitement, or which consists of exhaustion of power*, requires means proportionate to its degree and form. The most intense grade of exhaustion occurs in the last stages of adynamic or malignant fevers, and of some other acute diseases; and often demands not merely permanent excitants, but the more active stimuli, as camphor, ammonia, serpentaria, arnica, wine, spirits, æthers, &c., to prevent the rapid extinction of life: whilst other states of exhaustion, especially such as are slower in their accession, or follow local inflammations, spasmodic or hæmorrhagic diseases, and the less severe forms of fever, admit only of the more gentle tonics; and even these, particularly if they be not cautiously prescribed, may reproduce the disease which occasioned the debility, especially if it was inflammatory or hæmorrhagic. It is not uncommon to find acute inflammations rekindled, or chronic inflammations follow the acute; and relapses of fevers, or visceral engorgements, or obstructions, supervene, when the exhaustion has been treated by heating tonics or stimulants, or by a premature use of a too full or stimulating diet. On the other hand, too strict exemption from all restorative means has been not infrequently followed by permanent general or local debility, or by very slow recovery; and it has often favoured the accession of other acute or chronic diseases; exhaustion predisposing the system to be impressed by their exciting causes. In the more difficult and doubtful circumstances of this form of debility, it will be, upon the whole, judicious to trust chiefly to wholesome air and suitable diet; and, if tonics or stimulants are



necessary, to select those which are the least heating, and to exhibit them along, or alternately, with such medicines as will promote the secretions and excretions most requiring aid, and with internal and external derivatives from the principal seat of disease. In cases of this description, particularly in the young, and in those who previously enjoyed a sound constitution, the returning energies of life generally stand but little in need of a spur; they require rather a judicious guidance, especially in respect of the digestive, the secreting, and excreting functions.

37. iii. *Complicated Debility*, or that condition of the frame which consists not merely of a depressed, but of an otherwise morbid state of vital power, has been ascribed above—1st, to unwholesome food, and to imperfect assimilation; 2dly, to an impure or altered state of the circulating fluid, occasioned by impeded or disordered secretion and excretion; and, 3dly, to the absorption of morbid matters into the blood, either from some one of the mucous surfaces, or from parts of the body in which they have been generated. The operation and effects of these sources of contamination have been fully insisted on in the articles *ABSORPTION*, and *BLOOD* (§ 110—151.). The indications of removing them may be resolved into the following:—1st, To cut off the supply from the sources of contamination; 2d, To raise the powers of life, as expressed chiefly in the *ganglial* and *circulating systems*, by the means pointed out under that head (§ 31.); 3d, To promote the depuratory actions of the emunctories.

38. A. The propriety of endeavouring to accomplish the *first* of these intentions cannot be questioned; but, when the contaminating matters are formed in some part of the system, as in various malignant diseases, apparently local at their commencement, it frequently cannot be put in practice, or the period at which it might have been attempted with any prospect of success may have passed, and the other intentions are our only resort.—B. The *second* indication is to be fulfilled by the remedies already noticed (§ 31.), and the treatment recommended in the article *BLOOD* (§ 157.); particularly by the alkaline chlorates; the preparations of bark, of iodine, of iron, of arsenic, or of zinc; by astringents and antiseptics, as the acetic and citric acids, &c.; by the preparations of the bitter roots and woods, or of the aromatic and tonic barks, with liquor potassa, or the alkaline sub-carbonates, in the more chronic diseases, and with the sulphuric, the muriatic, or nitric acids, in the more acute maladies, and with warm spices, &c.; and by the gum-resins, the balsams, the terebinthines and camphor, prescribed according to the circumstances of the case.—C. But whilst we are endeavouring to elevate vital energy by those and other means, we should also fulfil the *third* intention, by associating, or alternating, them with the more tonic and stomachic purgatives, or with warm and stimulating diaphoretics, as the abdominal or the cutaneous secretions may require to be promoted.

39. iv. *Debility affecting chiefly associated organs, or particular textures*, requires nearly similar means to those already advised, according to the grade and form it may assume. The treatment of

its manifestations in the *ganglial* and *vascular systems*, and in the *digestive viscera*, has been already noticed; and is still more particularly discussed in the articles *BLOOD*, *COLON*, *INDIGESTION*, &c.—A. Debility of the *cerebro-spinal organs* must be treated according to the causes that have occasioned it, and the characters it presents. The causes, whether moral or physical, should be removed or counteracted as far as possible; and if it have arisen from mental excitement, repose and agreeable amusement should be inculcated. (a) When it is characterised by increased *sensibility*, the bitter infusions with liquor potassæ or the sub-carbonates of soda or potash, with conium or hyoscyamus; the preparations of iron; chalybeates; vegetable tonics and aromatics, with small doses of opium or the preparations of morphine; cold or shower baths; sea-bathing, change of air, &c., mental tranquillity, and agreeable employment; are amongst the most efficacious means. (b) If it be attended by increased *irritability* or *mobility*, the mineral acids, alone or with bitter infusions; the preparations of cinchona; the acetic acid; HOFFMANN'S anodyne, valerian, assafoetida, musk, or vegetable tonics, with opiates or anodynes, the prussic acid, the Iceland moss, ass-milk, alkaline or tepid baths, &c., are suitable remedies. (c) If the debility be great, and particularly if it be attended by *torpor* or depression of the sensibility depending neither upon cerebral congestion, nor upon a plethoric state of the vascular system, the warm or diffusible stimulants, combined with permanent tonics; aromatics and cardiacs; iodine, strychnine, or the extract of nux vomica in small doses; coffee; camphor or phosphorus in minute quantities; warm salt water bathing; the shower bath; chlorine fumigating baths; the use of astringent and camphorated washes to the head and surface of the body; the nitro-muriatic acid bath, or sponging the surface of the trunk, or even the head itself, with a tepid wash containing these acids, may be tried and associated with the foregoing, or other internal remedies, according to the peculiarities of the case.

40. B. The *sexual organs* are debilitated—(a) from imperfect development, depending upon their interrupted evolution, or upon general asthenia; and (b) from over-excitement. The *first* of these causes seldom occurs in the male, but not infrequently in the female (see *CHLOROSIS*, and *MENSTRUATION*), and in such cases requires the constitutional treatment there described. The *second* cause is common to both sexes, although perhaps more so in the male than female. When it has thus originated, and exists merely in a slight degree, without amounting to impotency, the organs will recover their energies soon after marriage, if regular and abstemious habits be adopted. In other circumstances, and in severer cases, attention should be paid to the general health: the mind ought to be occupied by interesting pursuits; the patient should rise early in the morning, and use the shower bath, or local aspersion or affusion, and live regularly. If the causes in which it originated be relinquished, the sexual function will soon be restored. The tonics which are the most efficacious in cases of this description are, the muriated tincture of iron, taken in the infusion of quassia, or of chamomile flowers; the tincture of iodine; coffee; and the extract of conium,



with the preparations of cinchona, cascarilla, or iron, &c. (See IMPOTENCY and STERILITY.)

41. C. The manifestations of debility in the cellular, the mucous, and other tissues, must be treated according to the principles already stated. When asthenia in any of its various forms affects the digestive *mucous surface*, the treatment already noticed (§ 34.) is applicable. If it be attended by hæmatemesis, malæna, or intestinal hæmorrhage, the terebinthines, and sulphuric acid, either alone or with tonic decoctions, or the superacetate of lead with acetic acid and opium, are the most energetic. If it manifest itself chiefly in the *respiratory mucous membrane*, the astringent tonics, the mineral or vegetable acids, the inhalation of the fumes of astringent and tonic substances (see BRONCHI, § 100.), sponging the chest daily with tepid or cold astringent lotions, change of air, sea-voyaging, and horse exercise, are amongst the most salutary measures.

42. v. Of the various constitutional and local diseases with which debility is commonly associated (§ 25, 26.), little or no mention need be made at this place, as they are particularly noticed elsewhere. I may, however, remark that inflammations occurring in a debilitated and cachectic state of the frame, more especially if the debility be of that complicated kind described above (§ 11.), are characterised by deficient energy of all the functions actuated by the organic nervous system, and by imperfect tone of the vascular and capillary system itself (see INFLAMMATIONS — *Asthenic Forms of*); and that they seldom admit of the large depletions which are indispensable in the healthy or sthenic states of those diseases. The inflammations which not infrequently supervene in the course of adynamic fevers, and certain forms of erysipelas, as well as various other associations of the pathological conditions now under consideration, fully illustrate this position. Such asthenic forms of complicated disease, however greatly increased the general vascular action attending them may be, require the powers of life to be supported, and, in many cases, powerful tonics and stimulants to be exhibited, even at the time that it may be necessary to resort to local or derivative bleedings in order to prevent the disorganisation of the viscus especially affected. In all such maladies, the pulse is remarkably quick, often full, but soft and compressible — a state which, although resulting from depressed vital energy, is too generally viewed as evincing a very different condition; and depletions, often the very cause of the great frequency of the pulse, are resorted to, in order to render it slower — to perform an impossibility: the important pathological facts, that great quickness of pulse is the consequence of debility, and that the most tumultuous and morbidly increased vascular action is very frequently associated with the utmost depression of vital power, being either unknown or overlooked.

43. vii. The treatment of the debility attending convalescence from disease has been partly anticipated, particularly at § 36.; but I may here offer a few additional remarks on this important subject. — a. The great susceptibility of the system to impressions from external agents or mental emotions; attending the debility of the early stage of convalescence, should make the practitioner cautious as to its management. Exposure to cold, the premature exhibition of stimu-

lants or of too heating tonics, too great indulgence of the appetite, and inappropriate food, may occasion relapses, may favour the supervention of other diseases, and may thereby superinduce dangerous or irremediable organic change. This is no infrequent occurrence after fevers, particularly the exanthematous, and after inflammations of the viscera. Such unfavourable results proceed not merely from the above causes, but also from inattention to the secretions and excretions; the patient often relinquishing too soon the use of those means which are still requisite to enable the weak powers of life to perform their various functions. The laying aside the use of medicines too soon is even still more frequently productive of mischief in convalescence from chronic diseases, particularly those of the bowels and liver, and dropsies. In these, the use even of the same means that removed the complaint is often necessary for a considerable time afterwards, either in different doses or in modified forms. During the whole period of recovery, the causes which produced the malady ought to be carefully avoided; and the physician should prescribe the diet and regimen of the patient, and such other measures as may seem to him calculated to ensure the object proposed. The articles of diet should at first be bland, digestible, and in small quantity, which may afterwards be gradually increased; and, with the returning powers, the farinaceous food first adopted may be added to weak animal decoctions, — or to milk, particularly asses' milk. Subsequently white fish, boiled; or chicken, rabbit, game, or the lean of well-fed mutton, may be taken, at first in small quantity and without heating condiments. Although white fish or flesh may not be more readily digested than game, venison, or mutton, yet they are generally not so heating as the last-mentioned article, or as beef. Before wine, or any other exciting beverage, be allowed, the effects of the gentle and tonic bitters, in the form of infusion, should be first observed; and if these occasion no febrile excitement, nor accelerate the pulse, a little old wine, particularly Hermitage, sherry, or East India Madeira, may be taken in water with the principal meal.

44. b. The temperature of the room, and the bed and body clothing of the patient, ought to be duly regulated according to his habits, and the peculiarities of the case, and with strict regard to ventilation. Subsequently, change of air and suitable exercise should be prescribed; at first in a close or open carriage, according to the season; and afterwards on foot, or on horseback; the last of which, and sea-voyaging, being the best suited to convalescents from pulmonary diseases.

45. vii. Moral Regimen; and other means. — A. There are various other remedies that may be resorted to in the more urgent cases of debility; but these are pointed out in the articles on the specific diseases, of which debility forms an important part. — a. The internal use of tar water; once so inordinately lauded, and subsequently so very undeservedly neglected, and medicated baths, may, however, be here noticed. I have had several opportunities of observing the good effects of a course of tar water, or of an infusion or decoction of pine tops and shoots, in simple debility, and in complaints chiefly to be referred to this state of vital endowment. — b. The idea that



the skin is entirely incapable of absorbing fluids in which it may be immersed, has led to the neglect of *medicated baths*. But it should be recollected that, independently of any power of absorption this structure may possess,—and which I believe it possesses under some circumstances, and in respect of various agents,—it is a living, an active, a finely sensible, and, as to the nature and extent of its functions, an important organ; and that it is very susceptible of impressions by which not only its own functions are modified or altogether changed, but the actions of other organs are variously affected in consequence of the nervous and vascular connections and functional relations, which bind the different parts of the economy into one indivisible whole. Entertaining such views, I believe that cold, tepid, warm, or medicated baths; that lotions or washes, or stimulating liniments and frictions applied to the surface,—the former in slighter cases, the latter in the more urgent; are not infrequently beneficial in diseases of debility, when judiciously employed, and with due reference to antecedent or existing visceral disorder. Sea or salt water bathing; shower baths; camphor and chalybeate baths; warm, tepid, or cold baths, either general or local, of iodine, or of iodine and sub-carbonate of potassa; baths of decoctions of willow or oak bark, sometimes with the addition of an alkaline sub-carbonate; washes with camphor water, rose water, and vinegar, applied to the trunk; or sponging the surface daily with a mixture of these, at a temperature of about 60°; or with a small proportion of the nitric and muriatic acids in water at a temperature of 70° to 80°; are respectively of much service, when suitably prescribed.

46. *B. Moral treatment*, or attention to such mental impressions and emotions as are calculated to promote the physical means resorted to, is particularly beneficial in restoring the vital powers, especially when the nervous systems manifest a more than ordinary share of depression and its attendant disorders. The manner and bearing of the physician, when calculated to inspire *confidence*, will of themselves do much in fulfilling the intentions of his prescriptions. The faith reposed in the remedies resorted to will often accomplish as much as they are physically capable of performing, and not infrequently much more. In order to inspire this feeling, the physician should himself evince a calm, and, in cases of great danger and depression of the vital energies, a cheerful confidence. Hope, in whatever form it may be excited, and in every degree to which it can be elevated, is a most powerful agent in combating diseases of debility; whilst its opposite, despondency,—the consequence and the cause of debility,—is one of the greatest evils we have to guard against in these maladies. Every practitioner whose range of observation has comprised the malignant diseases of warm climates, or of temperate countries, must have remarked, that when the patient dreads, and still more if he entertains a sentiment of, an unfavourable issue, or if he be apathetic and careless of the event, the very worst sign of depressed vital power has appeared, and the most active moral and physical stimulants are then required; whilst, on the other hand, a firm confidence in the physician, and ardent desire of recovery, are

the best aids by which his endeavours can be seconded.

47. *C. Travelling*,—owing to the exercise, the change of air, the continued succession of novel and exciting objects presented to the senses, the agreeable occupation, without exhaustion of the mind which attends it, and the amusing and exhilarating matters incidental to it,—is one of the most efficacious means of restoring the depressed or exhausted powers of the frame, especially the enfeebled functions of the digestive organs and of the nervous system; and nearly allied to it, are *pleasant society*, rational *amusements*, and varied, interesting, but not fatiguing, bodily and mental *employments*.

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DEGLUTITION, DIFFICULT.—*SYN.* *Dysphagia* (from δὺς, *difficulty*, and φάγω, *I eat or swallow*). *Deglutitio difficilis vel impedita*, Auct. *Schweres Schlingen*, Ger. *Dysphagie*, Fr. *Dysphagy*. *Difficulty of Swallowing*.

CLASSIF.—1. *Class*, Diseases of the Digestive Function; 1. *Order*, Affecting



the Alimentary Canal (*Good*). SPECIAL AND GENERAL PATHOLOGY; *Symptomatology* (*Author, &c.*).

1. Difficult or obstructed deglutition is an occasional symptom of several diseases, and a constant concomitant of a great variety of organic changes, affecting the *fauces*, the *pharynx*, the *œsophagus*, or parts in their immediate vicinity; and which are discussed under these heads, particularly in the article on the *ŒSOPHAGUS*. After having noticed the only *idiopathic form* in which dysphagy can strictly be said to occur, I shall arrange those pathological states of which it is an important phenomenon, and with reference to the places in which they are more appropriately described, and to the principles and means of cure.

I. PRIMARY OR IDIOPATHIC DYSPHAGY. *Nervous Quinsey, HEBERDEN.*

CLASSIF.—II. CLASS, I. ORDER (*Author*).

2. DEFIN.—*Difficulty of swallowing, occurring suddenly, and accompanied by a choking sensation.*

3. i. This form of dysphagy is not infrequently observed. It generally takes place when the patient is apparently in good health; and chiefly in irritable, nervous, or weak constitutions. It is usually induced by violent gusts of temper, or mental emotions, or by dread of its accession; and is occasionally so severe as to threaten suffocation. When it affects the *œsophagus*, it gives rise to a sensation resembling that occasioned by the retention of an extraneous body; and matters attempted to be swallowed are either retained for some time, or rejected. When the *pharynx* is principally affected, deglutition is generally attended by a sense of choking. It may continue only for a minute or two, or it may be prolonged for several days, or even months, difficulty being present in various degrees upon each attempt at receiving substances into the stomach; or it may be remittent. It is often accompanied by the retention of flatus in the *œsophagus*, probably by spasm; the difficulty of deglutition being increased by the flatulent distension, but removed upon the discharge of flatus. It resembles in this the *globus hystericus*; but it differs from *hysteria* in the circumstance of its occurrence in males as well as in females, and independently of any of the other characteristic symptoms of that affection.

4. ii. The TREATMENT of primary or idiopathic dysphagy should be directed with the view, 1st, of relieving the existing difficulty; and, 2dly, of preventing its recurrence.—(*a*) The first object may be attained by swallowing slowly cold or iced fluids; by cold applications to the neck or throat; by cathartic, anodyne, and antispasmodic enemata; and by camphorated liniments, or antispasmodic and anodyne plasters placed on the sternum or throat. (*b*) The recurrence of the affection will be prevented by the internal use of vegetable bitters and tonics, with the alkaline sub-carbonates; by narcotics or antispasmodics combined with *ipeacuanha*; and by a free action kept up for some time on the lower bowels, by means of the resinous or other purgatives conjoined with vegetable bitters, and promoted by clysters. The other means, mentioned hereafter (§ 16.) will also prove useful adjuvants.

II. SYMPTOMATIC AND COMPLICATED DYSPHAGY.

CLASSIF.—GENERAL PATHOLOGY; *Therapeutics, &c.*

5. Difficult or obstructed deglutition is an occa-

sional or constant attendant upon a variety of functional disorders, and of organic changes. 1st. It is often symptomatic of hysterical, hypochondriacal, flatulent, and asthmatic affections. 2d. It is constantly attendant upon tetanus and rabidity. 3d. It is sometimes produced by organic change seated in parts about the base of the brain or cranium, the medulla oblongata, or upper part of the spinal chord. In all these symptomatic states, the parts immediately concerned in the function of deglutition are seldom, and not necessarily, affected organically: but in the following there always exists either inflammatory action, or its consequences, or some structural change, in the parts by which food is conveyed into the stomach, or in their immediate vicinity. The preceding may be called *symptomatic forms* of dysphagy; those which are to follow, *complicated states* of this affection. Under this latter may be arranged, 1st, Dysphagy from congenital malformations; 2dly, From inflammation, or structural lesions of the mouth, tongue, fauces, pharynx, or tonsils; 3dly, From diseases of the epiglottis or larynx; 4thly, From inflammations or structural lesions of the *œsophagus*, or of the cardiac orifice of the stomach; 5thly, From tumours pressing upon the pharynx, or on the *œsophagus*. On each of these I shall add but few remarks.

6. i. SYMPTOMATIC OR SYMPATHETIC DYSPHAGY.—*A. Of spasmodic or flatulent diseases.* Difficulty of swallowing occasioned by *hysteria*, *hypochondriasis*, *spasmodic asthma*, *dyspepsia*, and even *rabidity*, is in a great measure to be ascribed to a flatulent distension of a portion of the *œsophagus*, with spasmodic constriction of other parts of this tube, and disposition to convulsive or spasmodic action of the muscles of the pharynx, either upon certain occasions of their being excited by the mind, as in *hydrophobia*, or upon attempts at performing their usual functions. In many instances, particularly those connected with asthma, indigestion, or flatulence of the digestive canal, the difficulty is attributable rather to the ascent of flatus in the *œsophagus*, preventing the transmission of food into the stomach than to spasmodic action of the muscular parts concerned in the process. In these cases, the patient feels much pain, with a sense of distension or pressure under the sternum, and in the course of the *œsophagus* after swallowing.

7. *B. Dysphagy may be occasioned by structural lesion about the base of the brain or cervical portion of the spinal chord, or about the base of the cranium.* In such cases, the paralysis may be more or less complete; and it may be limited to the muscles of the pharynx and upper part of the *œsophagus* (BONET, PORTAL, BALDINGER, and myself), or it may have extended to them from other parts. Numerous cases illustrating these positions have been recorded. The participation of the muscles of deglutition in either general or partial paralysis is very commonly observed in apoplexy, &c.; and the occurrence of this form of dysphagy, independently of organic change, or rather from congestion about the base of the brain, is shown by its occasional accession in the advanced stages of fevers. Paralysis of the muscles concerned in this function may also be produced by wounds of the nerves of the face (PALLETTI), by



lightning (PATERSON), and by severe cold (BLEULAND). It is, however, most frequently caused by the slow developement of tumours, or cysts, or other structural changes about the base of the cranium, whereby either the nerves supplying these muscles are compressed at their origin or in their course, or a portion of the brain or of the upper part of the spinal chord is injured.

8. ii. COMPLICATED DYSPHAGY, or difficult deglutition from structural change affecting the parts immediately concerned in this function, comprises a great variety of lesions. I shall merely enumerate them with reference to their seat; their nature, morbid relations, and treatment, being fully discussed under more appropriate heads.

9. A. *Dysphagy from congenital malformation.*—Extreme smallness, or enlargement of the tongue; the termination of the pharynx, or of the œsophagus, in a cul de sac, or obliteration of the œsophagus; the division of this part into two canals, and its communication with the trachea; are the chief malformations which interrupt deglutition; and are of very rare occurrence in otherwise well-formed infants. Cases, however, have been recorded by BLAES, VAN CUYCH, MICHEL, BILLARD, MARTIN, A. COOPER, and ANDRAL. In these, death, necessarily resulting from inanition, took place in from three to nine days. A slight interruption to deglutition very frequently arises from congenital fissures of the soft and hard palates.

10. B. *From diseases of the mouth and throat.*—(a) Inflammation or chronic enlargement of the tongue; ranula; sublingual calculus (GUENTHER); and aphthæ, ulceration, tumours, and excrescences about the base of the organ (REIDLIN, VAN SWIETEN, TODE, and INGLIS); are not infrequent causes of dysphagy. Cases of chronic enlargement of the tongue, impeding deglutition, unconnected with malignant disease, and continuing for many years, are recorded by several writers. I have seen an instance of this kind, that had existed from infancy to nearly middle age. These and other affections, with the treatment appropriate to them, are particularly noticed in the article upon the *Diseases of*, and the *Indications furnished by, the TONGUE.*—(b) The *fauces* and *tonsils* not uncommonly occasion dysphagy. Inflammation, suppuration, ulceration, or destruction of the soft palate, or of the uvula; great relaxation of the latter part; inflammation, abscess, chronic enlargement, and ulceration, of the *tonsils*; fungous and other tumours and polypi of the maxillary sinus, or posterior nares; various tumours or excrescences attached to the palate or tonsils (SCHMIDT, THILENIUS, &c.); and the severe effects of mercury, or the sudden arrest of salivation; are generally attended by more or less of dysphagy.—(c) When the *pharynx* is the seat of inflammation or of its consequences, or of the lesions now enumerated, or of malignant disease (KERGADEEC, and myself), deglutition is commonly much more impeded than when only the *fauces* are affected; and in some instances it is extremely difficult or nearly impossible. In such cases, the epiglottis and larynx are more or less irritated, and, by the consequent disorder of the respiratory actions, the dysphagy is still further increased. Foreign, and particularly pointed or sharp, bodies lodged in

the pharynx, are also sometimes causes of dysphagy.

11. C. *Dysphagy from disease of the epiglottis and larynx.*—(a) Inflammation, ulceration, and entire destruction of the epiglottis, or induration, incurvation, and the removal of it by wounds, will occasion difficult deglutition, as in the cases recorded by MAYNWARING, SCHURIG, BONET, DESGRANGES, TONANNI, and LARREY. (b) Also inflammation and ulceration of the larynx, ossification of its ligaments, and displacement of the *os hyoides*, are generally attended by dysphagy. The possibility of the occurrence of this last cause, although observed by VALSALVA, and MOLLINELLI, has been doubted; but the instance of it noticed by Sir C. BELL (*Surg. Observ.* p. 160.), and the case wherein it was caused by swallowing a large hard substance, recorded by Dr. MUGNA (*Annali Univers. di Med.* Nov. 1828.), put the matter at rest. Fracture of this bone by external violence has produced not only an impossibility of deglutition, but even more serious consequences, as shown in the cases published by Dr. MARCINKOWSKI and M. LALESQUE (*Journ. Hebdom. &c.*).—(See LARYNX — *Diseases of.*)

12. D. *Diseases of the œsophagus, and cardiac orifice of the stomach*, will impede or altogether obstruct deglutition. Inflammations and their consequences, as softening and ulceration, induration, thickening, stricture, and purulent collections between the coats of these parts; also partial dilatations, sacs and diverticula, or even large pouches, either with or without thickening and stricture of the part of the œsophagus immediately below the dilatation (BLASIUS, HALLER, MECKEL, MONRO, LUDLOW, C. BELL, ODIER); polypous or fungous excrescences or tumours of various kinds in some portion of this canal, or in the cardiac orifice of the stomach; or scrofulous, callous, cartilaginous, osseous, carcinomatous, or scirrhus degeneration of these parts; or merely enlargement or ulceration of their mucous glands; and spasm, rupture, or perforation of the œsophagus, or the lodgment of foreign bodies in it; are severally causes of dysphagy; and are fully described in the articles on the *Pathological Anatomy of the DIGESTIVE CANAL*; and on the *Diseases of the CÆSOPHAGUS*, as well as in those of the *STOMACH*.

13. E. *Tumours pressing upon the pharynx, or upon the œsophagus*,—as bronchocele, or other tumours or abscesses near the throat and in the neck; tumefaction of the lymphatic and secreting glands below the jaw, and at the top of the sternum; aneurism of the subclavian or carotid arteries, or of the aorta before it passes into the abdomen; enlarged bronchial glands, tumours of various kinds, and abscesses in the posterior mediastinum; exostoses or other diseases of the cervical vertebræ, and purulent collections between them and the œsophagus (CARMICHAEL, myself, and others); also abscesses formed between, or involving, the trachea and œsophagus (HAY and myself); dropsy of the pericardium (BANG); and enlargement of the liver; have severally been observed to occasion dysphagy.

14. iii. The *DIAGNOSIS* of dysphagy requires a few observations merely.—(a) In *idiopathic*, as well as in the *sympathetic* dysphagy, the difficulty takes place suddenly, disappears as suddenly, re-



mits or intermits, and is generally attended either by convulsive efforts, by choking sensations, or by flatulence, dyspepsy, or various nervous symptoms, particularly when it is connected with hysteria, hypochondriasis, &c.—(b) In cases of atonic or *paralytic* dysphagy, solids are more easily swallowed than liquids; but the process is often very slow, and the difficulty great.—(c) When it proceeds from disease of the *fauces*, the cause is obvious to the sight; and frequently also when it is induced by the state of the *pharynx*. In this latter case, as well as in dysphagy from lesions of the *epiglottis* and *larynx*, or from tumours or fungous excrescences developed in, or pressing upon, the *pharynx*, or from inflammatory diseases of it, or of the upper part of the *œsophagus*, substances are often forcibly ejected into or through the nostrils, upon attempts at deglutition, owing to the spasmodic action of the muscles of the *pharynx*.—

(d) When dysphagy is caused by a diminution of the canal of the *œsophagus*, either from thickening of its parietes, or from tumours pressing upon it, &c., difficulty of swallowing solids is first felt, and this at last is followed by a difficulty of swallowing fluids; the interruption to this function proceeding gradually and slowly. When the obstruction is seated low in this tube, or about the cardiac orifice of the stomach, pain is usually felt under the sternum after swallowing: and the matters are afterwards regurgitated into the mouth, owing either to a sudden reaction of the parietes of the canal, or more commonly to their inverted peristaltic action. (See art. *ŒSOPHAGUS—Diseases of.*)

15. iv. TREATMENT.—It must be evident that the treatment of sympathetic and complicated dysphagy should be conducted strictly according to the pathological state on which it depends, as far as that may be ascertained. Hence a tolerable knowledge of the means applicable to it, in every circumstance in which it presents itself, is to be acquired only by a reference to the articles where the various lesions occasioning it are described, in respect of their nature and cure.

16. A. *Sympathetic dysphagy*—(a) of *spasmodic* or *flatulent* disorders, requires very nearly the same treatment as already recommended in the idiopathic form of the disease. If it accompany *hysteria*, swallowing, slowly, cold or iced fluids, and cold applications to the neck, will soon afford relief; but it will afterwards be necessary to have recourse to tonics and cooling aperients, with other means suited to the peculiarities of the case. The instances in which TODE and WICHMANN found quassia so beneficial, were probably of this kind, or the idiopathic form already noticed.—(b) When dysphagy is connected with *flatulent dysphagy*, or with *asthma*, or *pulsations* of the heart, relief will generally be obtained from anodynes or antispasmodics combined with refrigerants, or from vegetable tonics with alkaline sub-carbonates and aperients. Blisters, or rubefacient plasters, or either of the ammoniacal, the compound galbanum, or the cummin plasters, with opium or the extract of belladonna, applied over the sternum or throat, will also materially assist the internal remedies. HEINECKEN advises the preparations of *zinc*, which, as well as the oxide of *bismuth*, may be tried in this form of dysphagy. He also recommends the distilled water of the *laurocerasus*, for which the hy-

*drocyanic acid* may be substituted with advantage. Besides these, the *cuprum ammoniatum*, the preparations of camphor with those of henbane or conium, may also be exhibited. In every form of dysphagia not depending upon organic change, purgatives, and cathartic and antispasmodic enmata, will be productive of more or less benefit.

17. (c) *Dysphagy from paralysis* or atony of the muscles of deglutition should be treated according to the principles stated in the article *PALSY*. If it be occasioned by congestion about the base of the brain or spinal chord, general or local bleedings, active cathartics, and external derivatives, must be employed. Congestion having been removed, large doses of camphor, as advised by HOFFMANN; stimulating linctuses and gargles; sialagogues; electricity and galvanism; exciting liniments or blisters to the neck or throat, as suggested by LOEFFLER; as well as moxas and issues; may be severally employed. Dr. BARTON recommends the *zanthoxylum* in cases of this description. THUNBERG and BALDINGER advise the cajepout oil to be rubbed on the neck; GARDANNE, *sinapisms* to be applied on the same part; and FRANCE, the *actual cautery*.

18. B. *Dysphagy from organic change* of the parts directly concerned in the function of deglutition requires means the most diversified, according to the nature of the lesions to which it is attributable.—(a) When it is *congenital*, but little can be done excepting in the slighter forms occasioned by cleft palate, or by adhesion of parts within the mouth. In these, the expert surgeon may afford complete relief.—(b) Difficult deglutition from diseases of the *tongue*, *fauces*, *tonsils*, or *larynx*, is of itself of minor importance; but as respects the primary lesion, of the utmost moment, requiring the most energetic measures pointed out in their treatment. (See these articles.)—(c) *Dysphagy from inflammations*, or their usual *consequences*, whether seated in the *pharynx*, the *œsophagus*, or the *cardiac* orifice of the stomach, should be treated according to the sthenic or asthenic form they may assume. After general or local depletions, especially cupping between the shoulders or over the sternum, emollient, cooling, and febrifuge linctuses ought to be taken at short intervals. I have prescribed, with advantage in such cases, especially when ulceration has been suspected to exist, linctuses containing the nitrate of potash, or the muriate of ammonia, or the sub-borate of soda, or the sub-carbonates of the fixed alkalies with the nitrate of potash and ipecacuanha, in addition to the other means described in the articles on the diseases of these organs. When foreign bodies are lodged in the *pharynx* or *œsophagus*, appropriate measures should be resorted to, either for extracting them, or for pushing them onwards into the stomach.—(d) When dysphagy is occasioned by *tumours developed in, or pressing upon, the œsophagus or cardia*, it is not always that their nature, or even their existence, can be fully ascertained. If their presence be inferred, or when they are developed in external parts, or if the diathesis be scrofulous, then iodine may be prescribed internally as well as externally, with potash, conium, &c.\*

\* I was consulted, in 1826, in the case of a young lady born in India, but who had resided some years in London. The glands in the neck, and underneath the sternal ends of the clavicle and sterno-mastoid muscles (as well



If *abscesses* have formed between the upper part of the œsophagus and cervical vertebræ, or between the former and the trachea, or about the pharynx, an unfavourable issue might possibly be averted by incisions made into them. If *aneurisms* press upon the gullet, the treatment recommended when discussing *Diseases of the ARTERIES* should be put in practice.—(e) When *thickening of the parietes* of a portion of the œsophagus, with more or less of *stricture* or *scirrhus* of this canal, or of the *cardia* of the stomach, is the cause of dysphagy, cupping, or leeches applied over the sternum; issues and moxas in the same situation, or in each side of the neck; the linctuses recommended above (§ 18. c.); mercurial and other alteratives, with conium, hyoscyamus, camphor, &c.; the iodide of mercury, or the hydriodate of potash, internally and externally; the sub-carbonates of the alkalies, or the liquor potassæ in emollients, &c., with various other means noticed in the article on the *ŒSOPHAGUS*, may be employed. If these fail, a careful trial may be made of the bougie; but the utmost attention should be paid not only to the manner of using it, but to the effects produced by it; for if the stricture be connected with sacs, pouches, or diverticula, or hernia of the inner coats through the muscular, or even with simple ulceration,—changes which not infrequently take place in the part immediately above the strictures—much mischief may result from even a cautious introduction of a bougie. The frequent and obvious connection of dysphagy with scrofula shows the propriety of prescribing the medicines found most serviceable in that disease, particularly when occurring in the scrofulous diathesis: and in such cases, the muriate of lime or of barytes, conium, liquor potassæ, and especially the preparations of iodine, should be fully tried.

19. C. The treatment advised by the best writers on this and its related affections consists of much that has been now stated; in addition to which, however, I may briefly add, that, the *muriate of baryta* has been recommended by KERKSIG; *cold and iced fluids*, by TODE and MONTAT; *conium*, by WICHMANN, COLLOMB, HUFELAND, and JOHNSTON; *hyoscyamus*, by WITHERING; *opiates*, by FERREIN and CONRADI; the *liquor potassa*, by HALLER; *emetics*, by FERREIN; and *local bleedings*, by FRANCK and BANG. *Calomel* and some other preparations of *mercury* have been prescribed by SEQUIRA, STEVENSON, ENGELHARD, BRANDIS, and others,—to the extent of producing salivation, by KRAMP, MUNCKLEY, BRISBANE, and FARQUHARSON—in the form of mercurial ointment, either alone or with the volatile liniment, rubbed over the sternum and throat, by DOBSON, PATTEN, KERKSIG, and WATHEN—internally, with antimony, by VAN GEUN—and with aloes and camphor, by HALLER, PATTEN, BANG, and BRANDIS, who contend strenuously for the occasional origin of dysphagy in suppressed rheumatism and repelled eruptions, and also recommend

external derivatives and irritants, as sinapisms, issues, setons, blisters, repeated or kept open, &c. The *surgical measures* to be resorted to in various circumstances of the disease are fully discussed in the writings of J. HUNTER (*Trans. of a Soc. for the Imp. of Med. and Chirurg. Knowledge*, vol. i. art. 10.), DESAULT (*Surgical Works*, &c.), RICHTER (*Chirurg. Biblioth.* b. xii. p. 11.), C. BELL (*Surgical Observ.* &c.), and S. COOPER (*Surgical Dictionary*, &c.).

20. D. The diet should be chiefly farinaceous, excepting in the nervous and spasmodic forms of the disease; and it ought always to be easy of digestion, and taken without any heating condiments. All substances which irritate or excite by their direct or indirect action, are injurious. The stomach also should never be loaded; and, in every circumstance, the secretions and excretions ought to be carefully regulated and promoted by gentle and appropriate means.

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DELIRIUM.—SYN. *Paraphrosyne*, *Paraphronia* (from *παρά*, erroneously, and *φρονέω*, I understand), Auct. var. *Paracope*, Swediaur. *Irvereden*, *Aberwitz*, Germ. *Délire*, Fr. *Delirio*, Ital.

CLASSIF.—PATHOLOGY; Symptomatology.

1. Delirium has been defined:—*Disorder of the intellectual powers, with or without derangement of the moral sentiments*. But this definition is too extended and vague, and embraces the whole circle of mental diseases. J. FRANCK, and some

as in various other parts of the body), were so greatly enlarged as to impede deglutition and respiration. She had been treated by several eminent practitioners; but the tumours had increased. In consultation with Mr. ANNESLEY, who had requested me to see her, a course of iodine was recommended; and the hydriodate of potash was employed, chiefly internally, for eight or nine months, with occasional intervals not exceeding a fortnight each. The glandular enlargements gradually subsided, the catamenia appeared, and she perfectly recovered. She is now well, and married.



other pathologists, have restricted it by adding — *this disorder assuming an acute form*. Several writers, retaining the preceding extended definition, have divided delirium into the *acute*, and the *chronic*; the former consisting of various morbid states of the brain, attended by mental disturbance and fever — the latter of mental alienation, unattended by fever or active bodily disorder. *Chronic delirium*, therefore, comprises all those states of disordered mental manifestation treated of in the article *INSANITY*. *Acute, or febrile delirium* refers to those morbid affections of mind supervening in the course of febrile, inflammatory, and some chronic diseases, and which have been denominated *symptomatic*, or *sympathetic delirium*; and those which are produced by acute diseases, or injuries of the brain or its membranes, and by intoxicating or narcotic substances; and which have been termed *idiopathic delirium* by some writers. The common acceptance of the word delirium, and that in which it has been used by the best authors, accords with the acute form as occurring in the manner now stated; and in this light I shall also view it. But it is more doubtful in how far it is ever an idiopathic affection. Indeed, in many of the diseases in which it is admitted by all to be a symptomatic or sympathetic disorder, its more immediate dependence upon a morbid state of vital endowment and circulation in the encephalon is as manifest as in some of those which have been viewed as idiopathic. The distinction, therefore, cannot be maintained, especially as it appears to have been founded upon a mistaken idea, viz. upon the supposed existence, in the reputedly idiopathic form, of inflammatory irritation or action of the brain or its membranes; which action does not obtain in the other. That delirium is most frequently occasioned by such a pathological state, cannot be doubted; but it is equally certain that it sometimes also proceeds from a different condition; and that either of them — either inflammatory action, or simple disturbance of the cerebral functions without inflammation — may exist in each of the divisions thus distinguished, — in the idiopathic, as well as in the sympathetic form. If the distinction in question be still retained, it would be more accordant with the generally admitted acceptance of the word idiopathic, to consider, as J. FRANCK has done, all the manifestations of delirium as symptomatic, excepting when it is occasioned by intoxicating and narcotic substances: but, when it proceeds from inflammation of the brain or its membranes, whether primarily or consecutively induced, to view it merely as a symptom, but by no means a constant, although a very general symptom, of this state of disease.

2. Delirium, as well as other cerebral affections, has been too generally imputed to inflammatory action; and the state of the ganglial or organic nervous power, which evidently influences both the functions and the circulation of the brain, has been entirely overlooked, particularly as respects this affection. There can be no doubt of the difficulty of appreciating correctly the nature or extent of the disorder which this part of the system experiences. But this circumstance surely does not preclude us from tracing ultimate phenomena to their true origin, instead of stopping at intermediate effects; nor from inferring, from the nature of these phenomena, and

of the causes which increase or remove them — from the *juvantia* and *lædantia* — certain general conclusions respecting the condition of that power whence morbid conditions primarily emanate; each successive effect being the cause of further change, until organic lesion, and ultimately death, result. Believing, therefore, on physiological grounds, that delirium is often the consequence of changes in the state of organic nervous power — of the functions of that part of the organic or ganglial system supplying the encephalic organs — influencing, in some cases, one or more of the mental manifestations, without any appreciable change of vascular action or of structure; in others, both function and circulation; and in many, not only function and circulation, but organisation also; and that our knowledge of these changes, of their signs, and of their various related circumstances, are too imperfect to enable us to come to accurate conclusions; but that we should proceed nevertheless with the aid of the dawn of knowledge now opening upon us; I shall briefly consider, first, the phenomena and diagnosis of delirium — afterwards, its pathology and treatment conformably to the doctrine now alluded to.

3. i. PHENOMENA. — *A.* The *invasion* of delirium is generally preceded by sleeplessness, headach, vertigo, heaviness of the head, noises in the ears, change of voice, absence of mind, forgetfulness of pain, by an air of surprise, and acuteness of the senses; the eyes are brilliant, and intolerant of light; the head is often hot, the face flushed, and the circulation of the brain more or less increased. In some cases, however, these symptoms are either altogether absent, or inappreciable; and in others the countenance is collapsed, pale, and cool, and the eyes sunk. To the foregoing phenomena succeed those which constitute delirium, and which vary remarkably in character and intensity. In many cases, particularly when there are few or no signs of augmented determination of blood to the head, a simple agitation or merely absence of the mind, or reverie, or wandering from the objects before it, or a slight incoherence in the ideas, is all that is observed; but, from this slight state of affection, we meet with every grade and form of mental disorder — sometimes with fright, visions or *illusions*, often connected with present objects; occasionally with *hallucinations*, or the reproduction, in confused or unconnected forms, of previous impressions; — in certain cases, with the most furious mental and physical agitation; in others, with the greatest depression and the most sombre taciturnity; — in one case, with tears and signs of great mental distress; in another, with a lively but incongruous current of ideas, or even with laughter and gaiety.

4. *B.* Delirium is frequently present at first only during the intermediate states between sleeping and waking, which patients in acute diseases experience; the mind still perceiving objects, but imperfectly. In this state the patient appears to dream aloud; and when fully awakened, returns rational answers to questions put to him; but he soon lapses into a state of dreamy incoherence, or into that of more complete delirium. This condition nearly approaches that of *coma vigil*, into which it often passes. In some instances, this state is characterised by a loss of recollection of all objects observed, and of all ideas with which the mind had been stored during the greater period



of life, and by the recovery of the memory of languages and of ideas acquired at a very early age, and long forgotten. Thus old persons, when delirious, although their minds are blanks as respects every thing present, or which have become known to them from youth or manhood, will talk of matters which had interested them previously to such periods, and sometimes in a language which they had then spoken, but of which objects and language they had no recollection long before their delirium, nor retained any after their recovery. Here, again, the remarkable similarity between several manifestations of delirium and dreams is strongly evinced; the objects and ideas about which the unconscious mind is engaged in the states of both delirium and dreaming being frequently those which had made a vivid impression in youth, which had become erased by the cares and employments of life, but which are recalled during certain conditions of the brain. The production of these in incongruous forms, and the giving utterance to the morbid conceptions formed of them, constitute *hallucinations*; whilst, owing to the nearly unconscious state of the mind, the imperfect and erroneous impressions made by surrounding objects on the senses of the patient, give rise to inconclusive and unconnected conceptions, in consequence of the morbid condition of the brain, and occasion the *illusions* characterising the delirious affection.

5. In addition to disorder of the mental powers, the organs of locomotion are remarkably affected. In the low or quiet delirium, and in the less dangerous states, in which the brain is only functionally deranged, the muscles are either somewhat agitated, or very much enfeebled; and the voice is very weak or nearly lost. In more severe cases, the voice and the muscular force are greatly increased; the patient, however, sinking into a state of profound collapse after a few violent efforts. In the most dangerous form of delirium, particularly when it proceeds from organic disease of the brain or its membranes, it is attended, but more frequently followed, by general convulsions, by spastic contractions of one or more of the voluntary muscles, by entire loss of consciousness and sensibility, or by paralysis.

6. C. Delirium, as M. GEORGET has remarked, may be *continued* or *intermittent*, even in the continued affections of the brain. When it is intermittent, it usually returns with the exacerbation of fever that takes place in the evening and night. When the patient recovers his reason, he is generally weak and exhausted; his senses are readily and painfully impressed by their respective stimuli; and he complains of thirst, and pains of the head and limbs. If the delirium has been slight, and consciousness has not been entirely abolished, he retains more or less recollection of what had passed during its continuance. But when it has been intense, or of some duration, he has no knowledge of what has occurred. The epidemic appearance of delirium mentioned by QUELMALZ (*De Epidem. Mentis Alienatione*. Lips. 1752.) and MICHAELIS (*Med. Pract. Biblioth. b. i. st. 1.*) is to be imputed to the prevalence of those diseases in which delirium is apt to supervene, and especially in that form on which it is most frequently an attendant. The *duration* of the

paroxysm of *intermittent* delirium varies from one to several hours; but the *continued* form, particularly when occasioned by disease within the head, may last several days, or even many weeks. Sometimes, as in the more severe cerebral cases, it alternates with profound coma. When it terminates fatally, it generally passes into coma; but in some instances the patient recovers his reason for a few hours before dissolution.

7. ii. DIAGNOSIS.—It is of the utmost importance that delirium should not be mistaken for *insanity*, and especially that the delirious patient should not be removed to an asylum for the insane. On two occasions I have seen such a mistake made, and about to be acted upon, when my opinion was requested. But these cases recovered perfectly: to one of them—a professional man—the removal to an asylum, or the supposition even of being insane, might have been ruinous. There can be no doubt that delirium often passes into insanity, especially when it has been caused by inflammatory states of the brain, and by fevers with determination to the part; or when it occurs in persons hereditarily predisposed to insanity; but until it has assumed the features of that form of mental disorder, it certainly in no respect should be viewed and treated as such.

8. The causes and circumstances originating *delirium* are often of themselves sufficient to show its difference from insanity. Its occurrence in the advanced stages of acute diseases, or of chronic maladies when the powers of life have become exhausted and febrile action of an acute kind has supervened, is especially characteristic of delirium. The *insane* patient has all his senses, as well as his digestive, assimilative, and locomotive powers, but little or not at all impaired. His mental faculties and intelligence are also but partially deranged. M. GEORGET has very justly remarked that the mental disorder of the insane is often confined to a single faculty; and even in the most extended, or maniacal affections, the faculties are rather perverted, or insulated, and without the bond of association, rather than extinguished. The most maniacally insane person wills and reasons, and is not always absurd in his actions. But in the delirious, all the cerebral functions are severely affected. His sensations are imperfect and incorrect, his ideas unconnected, his passions disordered, his voluntary motions irregular, feeble, and defective; his intelligence and recollection nearly abolished; and he is impassive to all that surrounds him. Whilst the *delirious* patient presents many of the physical signs of exhausted vital energy, or of the gravest state of disease, the *insane* has all the appearances of unimpaired health, particularly in the early stages of insanity, and before consecutive organic change has taken place. In the former, the sensations and perceptions are more or less abolished; in the latter, they are but little or not at all impaired,—the judgment only, or conviction of the understanding respecting them, being erroneous. The false conviction of the insane is too strong to be removed by the evidence of the senses: the sensations and perceptions of the delirious are always too weak, even when consciousness is partially present, to become the basis of sound



conclusions. Hence the insane person cannot be convinced by objects seen, heard, and understood by him, in opposition to his perverted judgment respecting them; and the delirious patient perceives objects so faintly, if he perceives them at all, as to be unable to distinguish between such as are in any respect similar, or to recognise one person from another. Besides the circumstance, also, of delirium being generally an *acute*, and insanity a *chronic* affection, it may be remarked, that in the former, when occurring from inflammatory states of the encephalon, or from fevers complicated with such states, the return to the healthy function is often so slow as to occasion fears of the supervention of the latter. In some instances, however, the restoration from febrile delirium has been quick, and the mental manifestations have become even more active than previously to the seizure.

9. iii. PATHOLOGY.—It is of the utmost practical importance to distinguish the different forms of delirium, particularly in respect of the grade of vascular excitement and vital power, and the existence or non-existence of inflammatory action, for, without such a step is previously taken, no rational method of cure can be adopted. I shall therefore attempt to make this distinction.

10. A. *Delirium attended by exhausted nervous and vital influence* is sometimes occasioned by excessive hæmorrhages or venæsection, by inanition, prolonged lactation, and profuse seminal or other discharges, by old age, hysteria, fear, &c. It also occasionally supervenes from exhaustion in the last stages of some acute and chronic diseases, or from whatever directly or indirectly depresses the powers of life, as shown in the article DEBILITY. In many such cases, however, although the vital energies are sunk, yet the brain is more or less excited relatively to the other parts of the body; and in some, the state of delirium is connected with an impure or contaminated condition of the circulating fluids, particularly when it occurs in the advanced course of malignant diseases. The delirium, also, which is caused by excessive pain, by capital operations, by the suppression of the appearances of pain or suffering, or by the apprehension of the consequences of operations, and which M. DUPUYTREN has very appropriately denominated *nervous delirium*, chiefly falls under this form of the affection; and to it may be added many of the instances of delirium caused by excessive irritation in remote but related organs or parts, as consumption, ulcerations of the bowels, worms, &c. Although it is often obvious that a relatively increased determination of blood to the head exists in some cases of this form of delirium, yet it may be inferred, with equal justice, that a deficient supply of blood to the brain obtains in others. This conclusion may be legitimately drawn from the pale, cool, shrunk features, sunk eyes, the weak and small pulsation of the carotids, the effects of various kinds of treatment, and the absence of increased or even common vascularity of the brain upon examination after death, in some cases of this form of delirium. This opinion has been supported by M. GEORGET and several other pathologists, without having been imputed by them to its obvious source, *viz.* exhausted power of the

organic nerves supplying the vessels of the brain.

11. B. *Delirium characterised by depressed or exhausted vital power, and morbidly excited vascular action*, is by far the most common form; and is very frequently observed in the advanced progress of continued, remittent, intermittent, malignant, and exanthematous fevers; of acute inflammations; and of several chronic diseases, particularly when they pass into the acute form. It may also be occasioned by any of the narcotic or acro-narcotic poisons, or from their exhibition in enemata; and in some temperaments and constitutions, by a small quantity of those in common use,—as by opium, stramonium, belladonna, &c. I have more than once seen it produced even by the preparations of hop and hyoscyamus taken in moderate doses. Its occurrence from the medicinal exhibition of various narcotic and poisonous substances is noticed by various writers;—from cicuta, by WEPFER and SMETIUS (*Miscell.* p. 569.); from belladonna, by PELARGUS and VALENTINI (*De Maniacis ab Usu Bellad. &c.*); and even by the superacetate of lead, by STOLL (*Rat. Med.* par. vii. p. 317.) and KNIGHT (*Lond. Med. and Phys. Journ.* vol. iv. p. 286.).—DIOSCORIDES (*Mat. Med.* l. iv. cap. 63.), WESTPHAL (*Pathol. Dæmoniaca*, p. 33—36.), and HORN (*Archiv.* Nov. 1811, p. 540.), have noticed the occurrence of delirium from hyoscyamus exhibited in clysters. Poisoning by various substances, as the *Lolium temulentum*, and some of the narcotics just mentioned, generally occasions delirium. It may also arise from indigestible substances taken into the stomach. In all these cases, in addition to the states of the system connected with the appearance of this affection, there is generally increased excitement of the circulation in the brain, relatively to that in the rest of the body; and not infrequently an impure or altered state of the circulating fluid. The delirium occasioned by the protracted use, and the sudden disuse, of narcotics or spirituous liquors, by erysipelas, and retrocedent exanthemata, is of this kind, between which and *delirium tremens* there is often a close resemblance.

12. C. *Delirium occasioned by inflammatory action of the brain or its membranes*, when the inflammation takes place primarily, is seldom attended by very manifest exhaustion of vital power, at least to the extent of the preceding forms. When, however, the inflammatory action is very general throughout the brain or its membranes, or when it supervenes on continued fevers or erysipelas, and is attended with serous effusion, vital depression is more apparent, and its termination in, or alternation with, coma, more common. This state of delirium, particularly when it proceeds from concussion or external injuries, is often phrenitic or maniacal—the *Delirium ferox* of authors—as respects the exaltation of muscular force. It is occasioned by all the causes stated to produce inflammation of the brain, particularly suppression of critical or accustomed evacuations, eruptions, or discharges; anger; the exciting passions; metastasis of specific inflammations; the ingestion of spirituous liquors, &c. Whilst the protracted use of intoxicating beverages, &c. occasions *delirium tremens*, unaccustomed intoxication sometimes produces the



delirium now being noticed, by inflaming the brain. This form of the affection is often complicated with convulsions, contractions of the limbs, paralysis, &c., particularly when the substance of the brain is organically changed; and is, when thus attended, very much more dangerous. (See BRAIN — *Inflammations of*, § 164.)

#### 13. iv. LESIONS OBSERVED IN FATAL CASES. —

In the *first* form of this affection, scarcely any, or no evident change, is found in the brain or its membranes, beyond either a somewhat increased or diminished vascularity, occasionally with a slight increase of the consistence of the cerebral substance, or of the fluid in the ventricles. In many cases, all the parts within the cranium are apparently sound. In the *second* variety, and wherever delirium is unattended by marked disorder of the muscular actions — when it is without extreme prostration, or convulsions, or paralysis — the chief changes are, increase of the consistence of the brain, and of the fluid contained in the ventricles, injection of the pia mater, sometimes with infiltration of serosity, and occasionally a somewhat deeper shade of colour in parts or the whole of the cerebral substance. M. GEORGET remarks that pathological investigations do not confirm the opinions of some authors, who impute the cause of delirium and convulsions to inflammation of the arachnoid; and that even epileptics and the insane seldom present the appearances usually caused by arachnitis. They have probably confounded inflammation of the membranes and periphery of the brain with the usual manifestations of delirium; and thus imputed the changes observed in the former, to the latter. In the *third* form of this affection, or when it is attended by the lesions of muscular action noticed above, the appearances observed are more completely those usually found after inflammation. Indeed, delirium frequently occurs, but not uniformly, or even generally, in nearly all the inflammatory diseases of the brain or of its membranes, and occasionally in the advanced stages of the organic changes limited to parts of this organ. (See art. BRAIN.)

14. v. PROGNOSIS. — The great diversity of the results furnished by *post mortem* investigations will show the difficulty of appreciating aright the conditions of the brain in delirium, and of coming to a correct conclusion as to its issue. When it is sympathetic of disease of remote organs, the worst opinion should be formed of the result. Delirium occurring in the advanced stages of diseases of the lungs, stomach, or bowels, is a most dangerous symptom; and when it supervenes in slow and consumptive maladies, it rarely remits, and death is not far distant. It seldom appears as a sympathetic affection, until the powers of life are greatly depressed; and the pulse is very much increased in frequency and diminished in tone. Dr. GILBERT (*Krankheiten der Französ. Arm.* p. 48.) observes, that delirium prevailed in the fevers which accompanied the French wars in Germany, in proportion to the frequency and weakness of the pulse, — a fact fully supporting the inference at which I had long ago arrived. On the other hand, when it appears in an intermittent or slight form, or from the operation of the less intense causes upon delicate and nervous constitutions, and without

other grave symptoms, although evincing the severity of affection, it is not, in itself, a dangerous occurrence. When it follows capital operations, or severe injuries of any kind, it very often indicates the developement of inflammatory action of the brain of a most dangerous or rapidly fatal form. Delirium is most frequent in females, in the nervous temperament, and in young persons above the age of eight or ten years; but it is, in such cases, a less unfavourable symptom. It is seldom observed previously to the fourth or fifth year, — convulsions usurping its place at an earlier age: but, when it occurs thus early in life, it is a sign of great febrile excitement, with either determination to, or acute inflammation of, the membranes or periphery of the brain. If it be continued, or alternate with coma; or if it be complicated, with extreme prostration of muscular power, or with convulsions, spastic contractions, paralysis; the existence of inflammation of the brain, to the extent of producing organic change and extreme danger, may be inferred. PERERIIUS, PISO, and many other writers, have contended that furious and sad or fretful delirium is more unfavourable than that which is tranquil or lively; and the observation seems to be nearly correct. The prognosis of sympathetic delirium should, however, not be founded so much upon its form, and the other symptoms referrible to the cerebro-spinal system, as upon the nature of the primary malady; for it is not the delirium which is in itself dangerous, but the disease upon which it supervenes; the circumstance of its occurrence evincing the very sinking condition of vital power. M. GEORGET truly states, that the sudden cessation of delirium and agitation, attended by want of recollection of the previous state, by great debility, irregularity of the action of the heart, and loss of temperature in the extremities, nose, and ears, is a most unfavourable omen; and often accompanies the termination, by gangrene, of inflammation of some important organ, always indicating approaching dissolution. When delirium accompanies fevers, particularly those with determination of blood to the encephalon, or inflammations of the brain or of its membranes, it often yields favourably to epistaxis, copious alvine discharges, and other critical evacuations. (See art. CRISES.)

15. vi. TREATMENT. — When the inexperienced practitioner, in his endeavours to obtain information as to the treatment of this affection, finds remedies of the most opposite kind very confidently recommended by writers, — venæsection by one, bark and stimulants by another, emetics or purgatives by a third, and digitalis, antimonials, &c. by a fourth, — he is at a loss how to act; and arrives at the conclusion, that if one be right, the others must necessarily be wrong. The fact, however, is, that all of them are partly right, but also partly wrong. The circumstance of this affection having been hitherto viewed without reference to the very different states or grades of vital energy with which it is often associated, or to the condition of circulation in the brain, and its division into idiopathic and symptomatic, — either of these divisions presenting the different forms I have endeavoured to distinguish, — has led to, and perpetuated, the empirical manner in which it has been treated. It is necessary to ascertain not only the origin and morbid relations of this affection, but the



phenomena attendant upon it at the time of investigation; more especially the condition of the secretions and excretions, the temperature of the head, the state of the pulse in the carotids and temples, the appearance of the countenance, and the state of muscular power and motion. These will at once indicate to the observing practitioner the existing pathological condition causing the affection,—will enable him to assign it to one or other of the forms above distinguished, and thereby to prescribe for it appropriate remedies.

16. *A.* The *first* form of this affection (§ 10.) will be most benefited by quietude, gentle restoratives, and nourishment; by a moderately cool, pure, and frequently renewed air; by the tepid affusion on, or cooling applications to, the head, if there be any increase of its temperature; by warm pediluvia; by camphor conjoined with refrigerants and cardiacs, or with sedatives; and, if the vital depression be very great, the head cool, and the carotids pulsating weakly, by the preparations of quinine or bark, of assafoetida, valerian, musk, camphor in large doses, with those of ammonia, opium, &c., exhibited by the mouth, and in clysters: or by small quantities of mulled wine or negus. In the more purely *nervous delirium*, or when it occurs from operations, anxiety, fear, and injuries of parts at a distance from the head, opium, given by the mouth, or in enemata, as recommended by M. DUPUYTREN, will be most beneficial. If it be attended by much agitation, narcotics—as opium or hyoscyamus—in full doses, either alone, or with camphor, assafoetida, soda, or ammonia, &c.; the acetate or muriate of morphine, with aromatics and cardiacs; quietude, in a cool, well-ventilated, and darkened apartment; the tepid affusion on, or cold-sponging, the head, if its temperature be increased; and warmth to the lower extremities; are the chief remedies.

17. *B.* In the *second* form of this affection (§ 11.), if there exist signs of determination of blood to, or of congestion in, the head, bleeding by cupping, or leeches applied behind the ears and below the occiput, the affusion of a stream of cold water on the vertex, and purging, are amongst the most efficient means that can be employed. If the delirium be attended by stupor, or tendency to *coma*, or by *subsultus tendinum*, picking of the bed-clothes, &c., blisters to the nape of the neck, and the treatment advised in the article *COMA*, will be requisite. If the delirious stupor be not removed by the more usual remedies, and if it have arisen from erysipelas of the head, incisions of the scalp of the occiput, as recommended by COPLAND HUTCHISON, may be practised. When there is no very considerable heat of the head, or when the extremities are cool, and the morbid secretions have been purged off, full doses of camphor (F. 494. 496. 903. 906.) may be exhibited. If the pulse be very weak, and the prostration of strength very great, the preparations of quinine or of bark, or of ammonia, camphor, assafoetida, valerian, musk, &c., with aromatics and cardiacs, or even wine in the form of negus, should be resorted to. When, with the vital depression and increased vascular action characterising this form of delirium, there are appearances of a morbid state of the circulating fluid, we should endeavour to rouse the vital energies at the same time that we excite the

secreting and depurating organs, by exhibiting camphor with the chlorates (the oxymuriates) of the alkalies (see F. 439. 845. 847. 928.), and the resinous purgatives with bitter tonics and stimulants (F. 492. 504. 572.). In such cases; the treatment recommended in the articles *BLOOD* (§ 156, *et seq.*), and *FEVER*, will also be appropriate. As soon as stupor and a tendency to coma appear, in addition to the medicines now suggested, cathartic and stimulant enemata (F. 139. 149.), or an active purgative draught (F. 216.), should be exhibited, and repeated according to circumstances; and if these fail, blisters, sinapisms, rubefacient cataplasms or liniments, may be resorted to. The terebinthines have been employed by me since 1819, with great benefit, in this and some other forms of febrile delirium. The practice has lately been favourably noticed by Dr. GRAVES (*Med. and Surg. Journ.* vol. ii. p. 782.). If the head be cool, and the pulse, particularly in the carotids, be weak, small, and very frequent, either in this or the preceding form, all revulsants from the head, even the keeping it elevated, or warm pediluvia, will be injurious; and may convert, as Dr. E. GILCHRIST (*Edin. Med. Essays and Observ.* vol. iv. p. 358, *et seq.*) long ago remarked, a tranquil, into a most violent, delirium, which may soon terminate in fatal exhaustion. In both the *first* and *second* forms of this affection, the practitioner should not be induced to resort to lowering measures, merely because the muscular force is momentarily increased, and the patient is violent, restless, and agitated. If, with this state, the pulse is very frequent, small, weak, or irregular, and the head not very hot, a restorative and soothing treatment will be more beneficial. I have repeatedly observed, that this form of the affection, when supervening on protracted and exhausting disease, has been almost immediately subdued by small quantities of warm spiced negus; by camphor, with capsicum and opium or hyoscyamus; and by frequently sponging the head with cold or tepid water, when its temperature has been increased, or by the tepid affusion.

18. *C.* The *third* or inflammatory form of delirium should be treated in every respect as described when discussing inflammation of the brain or its membranes. (See art. *BRAIN*.) General and local bleedings, cold affusions and applications to the head, &c., are indispensable in it. If the delirium be *complicated* with stupor, or coma, convulsions, contractions or paralysis of muscles, &c., vascular depletions and active alvine evacuations should be followed by external derivatives of a permanent kind; by incisions of the scalp; by issues, open blisters, moxas, the use of the tartar emetic ointment, dry-cupping, &c.; whilst the secretions, &c. should be promoted by mercurial and other alteratives, and the bowels fully evacuated from time to time by a cathartic draught (F. 216.), and enema (F. 149.). In every form of the affection, the patient should be irritated as little as possible by opposition, but indulged as much as is consistent with safety.

19. *D.* I shall conclude by noticing the *treatment recommended by some authors*.—(a) The topical application of *cold* has been advised by every writer on this affection, particularly since BARTHOLINUS so strenuously recommended it



(*De Usu Nivis Medico*, cap. 25.). It may be prescribed in the form of cold affusion, pounded ice, cold epithems, evaporating lotions on the head, or simple sponging. If, however, it be continued too long, or after the morbid heat has been subdued, and the features have shrunk, it will be injurious, by depressing the nervous energies too low, and favouring the supervention of coma, or violent agitations, terminating in fatal exhaustion. It is required chiefly in the *third* form of the disease; but in the *first* and *second* forms, when the temperature of the head is increased, it should be cautiously employed, or the tepid affusion substituted for it. In these, however, I have preferred that the scalp should be sponged with a tepid and very weak solution of the nitro-muriatic acid.—(b) *Camphor* has been nearly as universally prescribed. BÜCHNER (*De Præstantia Camphoræ in Deliriis*. Halæ, 1763.), and TODE (in *Soc. Med. Hann. Coll.* ii. No. 34.) especially recommended it,—the latter with mineral acids. It is a most excellent remedy when judiciously exhibited. If given at all in the *third* form of the affection, it should be in small doses, with nitre and antimony, or with digitalis. In the *first* form, it may be prescribed in larger quantity; and in the *second*, especially if there be stupor or coma, or a morbid state of the blood, in still larger doses, with tonics, antiseptics, aromatics, and cordials.—(c) *Opium* or *hyoscyamus* is noticed by PERCIVAL (*Lond. Med. and Phys. Journ.* vol. i. p. 443.), GOUBIER (*Journ. de Méd.* t. lxxxv. p. 244.), DUPUYTREN, and KORTUM (*Beyträge zur Pract. Arzneiwiss.* No. 9.). In some states of the *first* and *second* forms of the affection, when it is purely nervous, or is attended by much agitation, watchfulness, &c., either of these medicines may be employed. In the more doubtful cases, either of them may be safely exhibited with camphor and James's powder. In the *third* form, particularly when it assumes a *maniacal* or violent character, and after depletions have been carried as far as may be thought prudent, and the bowels have been freely evacuated, I have repeatedly seen a full dose of opium or hyoscyamus, given either alone, or with antimony, or James's powder, and camphor, produce the happiest effect. Any unpleasant symptom that may result either from too large doses of these narcotics, or from their inappropriate use, will readily be removed by the cold or tepid affusion on the head. The acetate or muriate of morphine, taken in a full dose of the spirits of pimenta, or in any other aromatic spirit, has proved equally beneficial with opium, in my practice. The *external* employment of opium has been found very successful in delirium, by V. CHIRURGHI (*Sull' Uso Esterno dell' Opio*, 8vo. Flor. 1797.), WARD (*Lond. Med. and Phys. Journ.* vol. i. p. 441.), and PERCIVAL (*Ibid.* p. 444.), who have used it in the form of liniment (3j. triturated with 3j. of adip. præp.), either with or without camphor.—(d) *Purgatives* have been justly praised by all writers on this affection. The ancients prescribed them in very large doses, and preferred the hellebores, which, with calomel and those I have already particularised, should be actively exhibited, according to the strength of the patient. When the debility is great, they must be associated with a tonic and stimulant treatment.—(e) *Emetics* have been mentioned by

several writers; and when delirium proceeds from the ingestion of narcotic, indigestible, irritating, or poisonous substances, or is connected with the accumulation of saburræ in the upper portions of the digestive tube, they are then requisite.—(f) *Antispasmodics* and *cordials*, particularly valerian (WARBURG, *Med. Beobacht.* No. 16.), assafoetida (WANTERS, *Journ. de Méd.* t. lvi. p. 115.), musk (KORTUM, *loc. cit.*), warm negus, and similar medicines, have been recommended; and are often of service, when the powers of life are much depressed.—(g) *Blisters* have been applied to the head much too indiscriminately: I have seen them prove most injurious in this situation. Dr. E. GILCHRIST, one of the best writers of his time, directs them both to the head and to the insides of the legs. I believe that they will prove beneficial in the former situation, only when the powers of life are sinking fast, and the delirium is attended by stupor, a cool head, and sunk or collapsed features, as in cases of low or adynamic fevers. When this affection is consequent upon febrile determination of blood to the head, blisters on the insides of the legs, &c. may be useful derivatives; but they often occasion so much pain and irritation in this situation, as to thereby counteract, particularly in the turbulent state of delirium, any good they might otherwise produce.—(h) Of the *sedatives* or *contra-stimulants* prescribed by writers, the preparations of antimony, particularly James's powder—digitalis, and the nitrate of potash, are the most deserving of notice. Wherever the delirium is connected with increased vascular action in, or determination to, the head, these medicines are of more or less service when judiciously combined with other appropriate remedies. WITHERING (*On Digitalis*, p. 33.) and PATTERSON (*Med. and Phys. Journ.* vol. v. p. 442.), strenuously advise the preparations of digitalis; but they, as well as those of antimony, require much caution, if ventured upon in the delirium attendant on low or malignant fevers. It is chiefly in the *maniacal* or *third* form of this affection that they are most beneficial, and in it they should be exhibited in a decided manner; but in the *first* and *second*, particularly in the delirium of typhus, they are generally injurious.—(i) The *actual cautery* on the nape of the neck, and *moxas*, have been advised by M. VALENTIN (*Med. and Phys. Journ.* vol. xix. p. 432.), and several other Continental writers.—(k) Dr. GRANT (*On Fevers*, 8vo. 1771.) recommends the patient to be allowed to dress and sit up when he feels anxious to do so; but this, and several judicious observations of this writer, are more fully adverted to in the article on FEVER. The observations made on convalescence from *Inflammations of the Brain*, and from FEVER, are perfectly applicable to the management of convalescence from delirium. (See these articles.)

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p. 395.

**DELIRIUM WITH TREMOR.**—**SYN.** *De-  
lirium Tremens*, Sutton. *Brain Fever*, Pear-  
son. *Brain Fever of Drunkards*, Armstrong.  
*Mania à Temulentia*, Klapp. *Mania à Potu*,  
Snowden and Carter. *Delirium Ebriositatis*,  
Blake. *Idiopathic Delirium*; *Delirium trem-  
efaciens*, Author. *La Folie des Ivrognes*, *Délire*  
*Tremblant*, Fr.

**CLASSIF.**—4. *Class*, Nervous Diseases;  
1. *Order*, Affecting the Intellect (*Good*).

**I. CLASS, IV. ORDER** (*Author*).

1. **DEFIN.**—*Delirious illusions, with constant  
tremor of the hands and limbs, watchfulness, and  
great frequency of pulse.*

2. This form of delirium is variously modified,  
according to the causes in which it originates,  
and the habits and constitution of the patient.  
Although it is here divided into two species; the  
one being evidently connected with inflammatory  
irritation of the arachnoid, or with excited vascular  
action in the membranes of the brain, and asso-  
ciated with great irritability—the other consisting  
chiefly of this last state, attended by exhausted  
nervous energy; yet it often presents interme-  
diate forms or modifications, which cannot be  
referred to the one species more than to the  
other. Nevertheless a distinction should be  
made, inasmuch as the predominance of the  
characters of either species will indicate the  
propriety of employing more or less of that  
treatment which is appropriate to it; for, owing  
to the want of such a distinction, the delirium  
which arises chiefly from intoxicating liquors  
has been too generally treated after one fashion,  
and in too empirical a manner, merely because  
it has presented one or two characteristic symp-  
toms,—its numerous other phenomena being en-  
tirely overlooked. Thus, when the disease arises,  
as it commonly does, from the abuse of intoxi-  
cating liquors, it may assume more or less of the  
features of either species, according as it is  
directly or indirectly produced by this cause;  
but if it be viewed as a consequence of inflam-  
matory action only, or as proceeding from  
nervous exhaustion exclusively, the conclusion  
will in either case be only partially correct, and  
the practice founded upon it frequently in-  
jurious.

3. **I. DELIRIUM WITH TREMOR AND EXCITED  
VASCULAR ACTION IN THE MEMBRANES OF THE  
BRAIN** (*Encephalitis Tremefaciens* of J. Frank).

4. **DEFIN.**—*With great terror and irritability  
of temper, and violence upon being opposed; a fre-  
quent, full, or hard pulse; countenance often wild  
or flushed, and the head hot.*

5. This species of delirium forms the connect-  
ing link between that which is purely nervous,  
and that depending upon inflammatory action of  
the membranes and periphery of the encephalon.  
That it may run into, or form a slight grade, or  
modification, of inflammation of these parts, in  
some cases, I will not dispute; but that it always  
is strictly inflammatory, is opposed by the fact  
that it will often subside spontaneously, in a

short time after its cause has ceased to act.  
The "*Delirium Ebriosum*" of DARWIN and some  
other writers, or the delirious affection which is  
immediately consequent upon intoxication, is an  
example of this; it sometimes subsiding in a few  
hours, or in a day or two, when not injudiciously  
interfered with; but this is only an occasional  
occurrence, and cannot be trusted to. This state  
of delirium, when directly produced, as it com-  
monly is, by intoxication, is not always cha-  
racterised by tremors at the commencement;  
but, when thus accompanied, it is often mistaken  
for the true form of delirium tremens, into which,  
however, it not infrequently passes, chiefly owing  
to the cause in which it had originated. It is  
generally attended by extreme irritability, often  
by great violence, and sometimes by general  
spasms and constant vomiting. The head is  
usually hot, and the face flushed. This species  
of idiopathic, or primary delirium, is caused, not  
only by the use of intoxicating liquors, opium,  
&c., but also by the excitement of the cerebral  
organs by intense or prolonged study, particularly  
when prosecuted under the influence of depressing  
causes. Dr. J. JOHNSON states, that he has seen  
delirium tremens in young ladies, whose mental  
powers had been exhausted by this cause; and  
most probably it was this species of disease  
that he had observed, as the treatment which  
he found successful in it is essentially the same  
as that which is most beneficial in this affec-  
tion. Delirium with tremors is also, in some  
rare instances, chiefly occasioned by excessive  
venereal indulgences, or masturbation; most  
probably, however, assisted by various concurrent  
causes.

6. **II. DELIRIUM WITH TREMOR FROM EXHAUST-  
ED NERVOUS POWER** (the *True Delirium Tremens*  
of modern writers, and *D. Traumaticum*, or *D.*  
*Nervosum*, DUPUYTREN).

7. **DEFIN.**—*With a morbid recurrence of the  
patient's ideas to his avocations; a frequent, weak,  
or small pulse; cool, humid, or perspiring surface;  
and loaded, but moist tongue.*

8. This disease was very generally con-  
founded with phrenitis, until Dr. SUTTON directed  
attention to it as a specific affection, requiring a  
peculiar treatment. As Dr. RYAN has remarked,  
it most probably constituted a large proportion of  
the cases named "*Demonomania*" by the writers  
of the 16th and 17th centuries. It had not, how-  
ever, altogether escaped attention, previously to  
the notice taken of it by Dr. SUTTON. Dr.  
PEARSON, of Newcastle, had written, for private  
circulation, a small tract respecting it; and cases  
illustrative of its nature and appropriate treat-  
ment had been shortly before published by Dr.  
M'WHIRTER (*Med. and Phys. Journ.* vol. xviii.  
p. 153.): Dr. SAUNDERS had also mentioned it  
in his lectures, delivered at GUY'S Hospital, about  
the close of the last century; and that mani-  
festation of it observed after external injuries is  
stated by Dr. BLAKE to have been noticed in  
Dr. COLLES'S Lectures on Surgery, with an accu-  
rate reference to its chief, although apparently  
the predisposing cause, and to the means of cure  
which repeated observation has shown to be most  
successful.

9. **i. CAUSES, &c.**—Whilst the former state  
of delirium is often *directly* occasioned by drunk-  
enness, this is as frequently *indirectly* produced



by the same cause; the one being immediately consequent upon or accompanying intoxication, the other commonly resulting from the abstraction of the accustomed stimulus, after an habitual or continued indulgence in it, or after a protracted fit of ebriety. A slight form of it, or merely tremors of the hands or limbs, with deficient nervous power, and occasional illusions, will sometimes appear after habitual tipping, without intoxication having once been produced. The use of intoxicating liquors, and the neglect of sufficient food; a protracted debauch, followed by sudden privation, or by depressing causes; large or repeated depletions employed to remove the headaches or stupor of drunkards, or the first species of this delirium; the treatment indicated by the diseases with which such persons may be affected; the debility caused by the diarrhoea or cholera sometimes consequent on intemperance; the shock arising out of severe injuries, particularly fractures; exposure to cold, a course of mercury, and the puerperal state\*; are principally concerned in the production of this affection. That the delirium which has been called "*D. Traumaticum*" by British writers, and "*D. Nervosum*" by DUPUYTREN, is in every respect the same as that now being considered, is proved by the fact of its appearance chiefly in persons of intemperate habits, by identity of phenomena, and by the effects of various modes of treatment upon both being alike.

10. Although the chief cause of delirium tremens is evidently the abuse of intoxicating, especially spirituous, liquors, yet this is not the only cause. It may also be occasioned by the drugged beverages prepared in Eastern countries, particularly in the East Indies, when too freely indulged in; and by the excessive use of opium. But it is chiefly when sobriety has followed a protracted debauch; and when, during the first days of the abstraction of the accustomed stimulus, the additional causes mentioned above, come in aid of the efficient cause,—when the habits and indulgences of the patient have produced that state of the nervous system which readily passes into serious disease upon its being influenced by depressing agents; that true delirium tremens takes place. Inattention to this fact, by nearly all the writers on the disease, excepting Dr. BLAKE, has led to serious misapprehensions. Practitioners have too generally concluded that the delirium of drunkards is always of the same kind; and have overlooked differences very generally subsisting between that immediately produced by intoxication—the *first* species of this affection; and that indirectly occasioned by it—the *second* species, or true delirium tremens. An occasional, or even a single indulgence in intoxicating liquors to excess will sometimes give rise to the former; a repeated, habitual, or protracted indulgence is requisite to the appearance of the latter. The frequency of this affection, particularly in the lower classes, justifies the attention recently paid to it; and I believe that it is more common now than formerly, owing to the cheapness, and facilities of procuring spirituous liquors. Between 1820 and 1832, I treated 19 cases, about two-thirds of which were in consult-

ation with Mr. HOULTON, Mr. BARNWELL, Mr. WINSTONE, and Mr. PAINTER; the others in dispensary and private practice. In some manufacturing and trading towns, it is of frequent occurrence. In the United States of America, it is, however, much more common than in this country. Dr. S. JACKSON states, that he has treated upwards of 200 cases; Dr. CARTER, of Philadelphia, mentions nearly the same number; Dr. WARE says, that he has seen more than 100; and Dr. WRIGHT, that he has received, in the institution at Baltimore, from 60 to 70 cases annually. But it is evident, from the details they have furnished, in the works referred to at the end of this article, that they have included under the same head delirious affections immediately consequent upon intoxication; and that, owing to this circumstance, has arisen much of the contrariety of opinion respecting the nature and treatment of the disease, which is as remarkable amongst physicians on the other, as on this, side of the Atlantic.

11. ii. SYMPTOMS.—The phenomena of delirium tremens vary remarkably, from the slightest forms of nervous tremor with spectral illusions, and accelerated pulse, to the most alarming state of vital depression, muscular agitation, and mental alienation, about to be noticed. Dr. BLAKE has marked out three stages into which the disease may with propriety be divided. It should, however, be recollected, that they are not always obvious or clearly defined; that they exist only in those cases which supervene on the abstraction of the intoxicating stimulus; that the first stage is wanting in those that more immediately follow intoxication, and consequently in most, if not all, the *first* species here described; and that, in the species now being considered, it is but seldom brought under the cognizance of the physician,—medical aid being seldom required until the second period is developed. As the treatment may be more precisely stated when the disease admits of a division into stages, I shall adopt that suggested by Dr. BLAKE, and which differs but little from that which has been followed by Dr. LYON, Dr. RYAN, and Dr. BARKHAUSEN.

12. The *first* stage of true delirium tremens frequently appears from two to eight or nine days after a protracted debauch, or a prolonged fit of intoxication; and is commonly attended by slight febrile action, and gastric derangement, often aggravated by some accidental cause, external injury, or contingent ailment (§ 9.), generally the immediate effect of excesses; but the length of time which elapses between the abstraction of the accustomed stimulus, and the commencement of the symptoms, is often uncertain. The first indications of the disease are, according to Dr. BLAKE, a peculiar slowness of the pulse, coldness and clamminess of the hands and feet, general debility, and diminution of the animal temperature. In addition to these, nausea and occasional vomiting, particularly in the morning; much diminution of appetite, and aversion from animal food; excessive perspiration from trivial exertion; frightful dreams; vertigo, and sometimes cramps of the extremities, are complained of. The bowels are often constipated, but sometimes open, or even relaxed, and the tongue is tremulous, furred, and moist. In

\* I have only seen two cases in females, and these were habitual drunkards; the disease appearing a few days after delivery.



most cases, the peculiar tremor of the hands is present in this stage; but in a few it is not remarked until the next. The spirits are much depressed; the patient sighs frequently; his countenance is anxious and dejected; he complains of oppression of the præcordia; is anxious about his affairs; and is either restless and watchful, or has short and broken slumbers. This state seldom continues longer than a few days. It is generally of longer duration in the old or worn-out drunkard, than in the younger and more robust, in whom it may be followed by increased vascular action in one or two days.

13. The *second stage* commences with restlessness, a peculiar wildness of the countenance, and a hurried anxious manner; marked susceptibility of the nervous system, and irritability of the muscular system; great excitability of temper, acceleration and smallness of the pulse, and various mental illusions and alienations. The heat of the surface of the trunk increases, but the hands and feet retain the same coldness and clamminess already noticed. The mental delusion becomes more constant as this stage is developed, and is generally of a low or melancholic kind, with continued reference to the patient's ruling passions and occupations, and anxiety respecting them. He sees objects where their presence is physically impossible; is continually haunted by frightful creatures, or occupied with most extravagant ideas, and is constantly endeavouring to avoid them. He now becomes altogether deprived of sleep; the restlessness and quickness of manner increase; the countenance is more anxious; the tongue is more deeply furred; the tremor of the hands and tongue continue, without remission; the bowels are either constipated, or, if relaxed, the evacuations are very dark and offensive; the urine is scanty; the pulse is soft, or small, and ranges between 100 and 120; the pupils are contracted, but the eyes are not intolerant of light; and the patient is talkative, constantly occupied with the objects of his delusions; he cannot be kept in one place; and, when opposed, is violent and noisy. This stage usually continues from one to three or four days; when it terminates, either in a general mitigation of symptoms, or in more profound collapse of the vital powers, thereby constituting the third stage.

14. The *third period*, in the slighter or more *favourable* cases, is ushered in with mitigation of the foregoing symptoms; yawning, drowsiness, and profound sleep, which generally terminate the disease; but in the more *dangerous cases*, the preceding phenomena become more severe, and accompanied by more complete depression of vital power, and increased irritability of mind. The patient makes violent and excessive struggles, which are attended by very copious perspiration. As the malady advances, and the energies sink, the coldness and clamminess of the hands and feet, which had been extending upwards during the second stage, spread over the whole surface; and the pulse becomes still more frequent, small, weak, or thready, and sometimes can hardly be counted: the tremor increases in the hands, and often invades the whole frame; and is rather a constant trembling, more nearly resembling that occasioned by severe cold, than the subsultus tendinum of typhus, or the nervous

rigors of some other affections. The perspiration becomes more and more cold, and exhales a peculiar smell, which is, as Dr. HODGSKIN has remarked, between a vinous and alliaceous odour. The countenance is commonly pale and anxious; the pupils very contracted; the tongue loaded, furred, and often brownish at the centre and root, and occasionally red at the point and edges; the patient talks incessantly, and with great rapidity; the delirium increases in violence; and the mind is excessively irritable, and continues so until shortly before death, when a calm takes place. In some cases, instead of this calm occurring, the patient is carried off in a convulsion.

15. *Modifications, &c.*—Such is the more common form of true delirium tremens; but whilst it sometimes occurs in slighter grades, in which the symptoms differ but little from simple nervous tremor, excepting that they are associated with mental illusions, great restlessness, and talkativeness, it also presents more severe forms, in which the phenomena approach those characterising the former species, or the delirium ebriosum, in which the vascular excitement generally, and that of the brain in particular, is greater, and relatively of a more sthenic kind. At the commencement and *second* stage of this state of the disease, the pulse is tenser and harder or fuller, the skin drier on the trunk, the delirium more violent, and comprehension less quick, than in the other cases. The eyes, also, are injected; the temperature of the head is somewhat increased; and the tongue is often dry or cracked, and red at its edges. In the *last* stage, the skin is bedewed with a cold clammy perspiration; the pupils are contracted; the pulse very small and frequent, often scarcely perceptible; the stomach is irritable, and the delirium becomes low and muttering. The tremors are constant, but the watchfulness is sometimes interrupted by short restless slumbers, which afford no relief; or it ends, in some cases, in a condition approaching to coma, passing at last into fatal convulsions. Thus some cases of the *second* form of the disease very nearly approach the *first*, and differ from it chiefly in being caused indirectly, instead of directly, by intoxication. The second species is, however, sometimes consequent upon the first, particularly when treated by too copious depletions; the vascular excitement of the one passing insensibly, but often rapidly, into the profound collapse marking the latter stages of the other; and this may even occur, although the delirium at the commencement was not attended by tremors. It should also be recollected, that the three stages into which true delirium tremens has been divided, are not always separated by any obvious limits, or even so distinctly defined as generally observed and stated above; the phenomena often supervening in so gradual and continuous a manner, as to render it difficult to determine the end or commencement of each, without much attention to all the symptoms and to the history of the case.

16. iii. *DIAGNOSIS.*—This disease, which is so difficult to describe, when once seen, can never be forgotten. It may, however, be mistaken for the first species, for phrenitis or inflammation of the membranes and periphery of the brain, for the delirium of fever, and for confirmed mania or insanity. — (a) It is to be distinguished from the



first species (the *encephalitis tremefaciens*) of this kind of delirium, by its coming on a short time after a protracted intoxication, instead of immediately upon it; by its being caused *indirectly*, instead of *directly*, by the abuse of intoxicating liquors; and by the pulse being stronger and fuller, the head hotter, the face more flushed, the surface of the trunk warmer, the delirium more violent, and the patient more irritable, the tongue drier and redder, and the vascular excitement comparatively greater and more sthenic, in the *first* species (§ 3.), than in the *second*; although occasionally a few cases of the latter approach these characters of the former. — (b) The same differences, but in greater degree, exist between delirium tremens and *phrenitis*, in which are wanting the cold, copious, clammy and peculiar perspiration, the soft pulse, and the moist tremulous tongue and hands. The impatience of light, and fulness of the vessels of the eyes, which accompany the latter, are not present in the former. The illusions, also, of delirium tremens are peculiar, and are accompanied with an anxious, fearful, and constant reference to concerns which had previously interested the patient in a particular manner. He can recognise his friends, and return a rational answer to some questions; and he is more tractable and manageable, when not irritated or opposed, than in *phrenitis*. — (c) This affection may be readily distinguished from the *delirium of fever* or *typhus*, by the history of the case — it being the primary and the most prominent ailment; delirium generally supervening late in fever. In this disease, the patient is quick in his movements; is agitated and talkative; is desirous to be up; walks about, when permitted, in a hurried manner; is anxious to follow his occupation, or to avoid, or to find out, or to chase away, some spectral illusion that haunts him; and is violent when opposed: in the delirium of fever, the patient is prostrate, his countenance less wild, his delirium is lower and quieter, and seldom attended by attempts to get out of bed, &c. (See DELIRIUM, § 3.7.10.) In the former, there is a marked tremor of the hands, &c. from the beginning, and the patient in the last stage seems to search after objects which he thinks he sees creeping over his bed, or floating before him: in the latter, the peculiar tremors are wanting; but there are subsultus tendinum, and picking at the bedclothes, or floccitation. — (d) From *maniacal insanity* it is to be distinguished chiefly, as stated above (b), by the great frequency and softness of pulse; by the copious, cold, and peculiar perspiration; the tremulousness; by the history of the case, — this being an acute, the other a chronic malady. When, however, it occurs in the puerperal state, in which I have seen it, the difficulty of distinguishing it from the mania sometimes supervening at that period may be considerable: the tremors, the greater frequency of pulse, and more copious and colder perspirations, will point out the nature of the affection, and will lead the physician to treat it according as the symptoms indicate a greater or less predominance of nervous exhaustion over vascular excitement.

17. iv. PROGNOSIS. — A first attack, in a constitution not yet much injured by the cause of the disease, generally terminates favourably. I have seen even a third attack end so; but its

more frequent recurrence, particularly if it be attended by signs of vascular irritation or erethism of the encephalon (§ 5.15.), or by dryness of the tongue, and its complication with some other disease, are circumstances indicating great danger. A want of correspondence in the pupils, and the supervention of subsultus tendinum or convulsions, or of low and muttering delirium, the pulse becoming quicker and smaller, are generally fatal signs. It is also more dangerous when caused by opium, than when proceeding from intoxication. On the other hand, a general mitigation of the symptoms, less frequency of pulse, with quiet or sound sleep, are indications of a favourable termination being at hand. In all cases, however, a cautious prognosis should be given, particularly in broken down constitutions; for success may elude our best efforts, even when most anticipated; and recovery may take place in the most apparently desperate circumstances.

18. v. PATHOLOGY. — A. The appearances on *dissection* have furnished only negative information as to the nature of the disease. In the true delirium tremens, the membranes of the *brain* evince but little change; the chief lesion consisting of slight opacity of the arachnoid, especially at the base of the brain and vicinity. The *pia mater* is somewhat injected, and a slight effusion of serum is occasionally observed in the ventricles. These appearances are, however, not constant; but they are more marked, and more manifestly inflammatory, in those cases which have accompanied or directly followed intoxication (§ 3.). In these, the vessels are often much congested, particularly those of the *velum interpositum*, the arachnoid thickened, and the serum more abundant, and occasionally even sanguineous. The *stomach* generally presents appearances of chronic gastritis, the villous membrane being either thickened or softened, or both, and the villi effaced. The *liver* is variously diseased, — often enlarged, granulated, of a yellow or fawn colour, or presenting the fatty degeneration. The lesions, however, of the stomach and liver, are coincidences only, or changes contingent on the habits of the patient, and not necessarily connected with the pathology of this disease.

19. B. The nature of this disease has been a subject of much discussion with modern writers, in consequence of no clear distinction having been made between that form of delirium with tremor, which is the result of vital, and particularly nervous, exhaustion; and that which depends chiefly upon excited circulation, vascular erethism, or inflammatory action, within the head. Although numerous instances will present themselves in which the former as well as the latter pathological state exists, the one, however, predominating over the other; yet the fact of either being present, almost solely, if not altogether so, perhaps, in a still greater number of cases, should not be overlooked, as it has been fully demonstrated, both by the post mortem appearances, and by the *juvantia* and *lædantia* during life. It is most probably in consequence of having noted the changes observed principally in the *first* species, or in such instances of the *second* as approach it the nearest, that Dr. CLUTTERBUCK and Dr. BRIGHT have viewed this latter as the consequence of inflammatory action in the arachnoid and *pia mater*.



I believe, however, that inflammatory irritation, although sometimes an attendant on this affection, is not necessarily connected with it, and certainly is not the pathological state which produces it; and that, when present, it is not the only condition which is requisite to the development of its pathognomonic characters; exhaustion or depression of both the nervous and sensorial powers being equally necessary to its supervention. It is probable, also, that the vital and nervous depression is increased by the morbid impression produced by accumulated secretions of a vitiated kind in the biliary system, and on the digestive mucous surface. This conclusion is deduced from a careful comparison instituted between the symptoms, the agents controlling them, and the morbid appearances observed upon dissection. From this it may be inferred that the pathological states in true delirium tremens, and in the delirium of typhus, are not widely different. It is probable that the state of the blood, the presence of congestion, and the greater affection of the substance of the brain, and of the organic functions, in the latter than in the former, may occasion all the differences of symptoms which exist between them; the vital exhaustion being nearly the same in both, or perhaps greater in typhus, and the nervous disturbance being more prominent in delirium tremens.

20. vi. TREATMENT.—Very opposite means of cure have been resorted to in delirium with tremor, owing to the circumstances above stated (§ 2.), and to the evidences of general as well as of local vascular excitement in some cases, or of nervous and sensorial exhaustion in others, or even of their co-existence with more or less predominance of either pathological condition. When it is considered that the inability to distinguish between such manifestations of the disease as depend in a great measure upon vascular excitement within the head, and those which result almost or altogether exclusively from exhausted nervous and sensorial power, must, in some cases, lead to an unsuccessful if not an injurious treatment, the necessity of investigating these points, of enquiring into the history of each case, and of arriving thereby at a correct diagnosis—which can be reached only by a strict reference to the existing pathological condition causing the morbid phenomena—before entering upon the treatment, will be evident. Having pointed out the means most beneficial in each of the species of this delirium above distinguished, the practitioner may apply them accordingly, and adopt more or less of either method, in order to meet the predominating characters which intermediate or more anomalous cases may present.

21. A. *Of the first species, or that with increased vascular excitement.*—This form of the disease requires moderate depletion, preferably by cupping, or leeches applied behind the ears, and below the occiput; cold washes or lotions, or the tepid or cold affusion, to the head, whenever its temperature rises above the natural standard; the tepid bath, or the surface of the body to be sponged with tepid water; purgatives combined with cordials, &c., if the nervous power be much depressed, or if the attack be occasioned by intoxication, particularly calomel with camphor or ammonia, or with both; aperient and antispasmodic enemata (F. 134. 149.); and the liquor

ammonia acetatis with excess of ammonia, and camphor julap. Purgatives are well borne: they may be given energetically, and be often repeated, in this state of the disease; but they should always be associated with stimulants and restoratives, and their action promoted by enemata containing assafoetida, the terebinthines, &c. When the affection is caused by spirituous liquors, we should be extremely cautious not to carry the depletion, although local, too far; and upon the first indication of the subsidence of vascular excitement about the head, we should endeavour to anticipate, and prevent the consequent depression which will otherwise ensue, by exhibiting, in addition to the ammonia-camphorated medicine now recommended, moderate doses of opium, or of laudanum, with the view of quieting the perturbation of the frame, and inducing sleep.

22. In the cases of this form of the disease, in which the vascular excitement either is not so great as to require bleeding, or has been somewhat reduced by this practice, emetics may be immediately exhibited. Dr. KLAPP, and other American writers, prescribe tartar emetic in frequent doses, in those cases which are referrible to the present species of affection, until it either has an emetic action, or nauseates and purges the patient; and Dr. BLAKE confirms the result of my experience, as now stated, in recommending emetics of sulphate of zinc, assisted by the administration of antispasmodics and stimulants, such as æther, camphor mixture, coffee, &c., with the application of cold to the head, while the surface of the body and extremities are sponged with tepid water; and, in some cases, bleeding, without being pushed so far as to increase debility. This treatment is, however, most appropriate when the affection is the direct result of intoxication; but when it arises from other causes (§ 5.), vascular depletions, purgatives, cold applications to the head, and a more sparing use of stimulants, are most appropriate.

23. B. *Treatment of the second species, or true delirium tremens.*—a. During the first stage we should endeavour to cut short the disease, by exhibiting, every hour, very small doses of laudanum in effervescing draughts, with the carbonate of ammonia, in camphor mixture; or the opium with full doses of camphor and ammonia; and by administering clysters, with assafoetida, camphor, and tinct. opii. Dr. CARTER, of Philadelphia, advises the mistura assafoetidae with tinctura opii to be taken every hour or two. Dr. BLAKE recommends the accustomed stimulus in moderate quantity, and at short intervals; but it may occasion a too violent reaction, unless the head be guarded by having frequent recourse to the tepid or cold affusion on it. In some cases, however, warm spiced negus or punch may be allowed, especially in exhausted and old drunkards. This is the only period in which blisters should be employed—if employed at all. The nape of the neck, or the epigastrium, is the preferable place on which to apply them. Anodyne and stimulating liniments (F. 297. 308.) rubbed over the epigastrium are, however, more efficacious. In some cases, a warm bath will precede the use of liniments with marked benefit.

24. Of all the cases of the disease I have seen, there has not been one that has not indicated the



propriety of prescribing cathartics, in order to remove accumulated secretions. From the quantity of very dark, offensive, bilious evacuations which they have procured,—often not until after their repeated exhibition, and even in cases where the bowels had been open or relaxed,—I have concluded that collections of vitiated bile in the gall-bladder and hepatic ducts have favoured the supervention of this peculiar affection. Under this conviction, I have always exhibited, as early as circumstances would permit, an active chologogue purgative, generally a bolus consisting of about ten grains of calomel, with as much camphor, and a grain of opium, in conserve of roses; and, in a few hours afterwards, a warm stomachic and aperient draught, followed in an hour or two by an enema (F. 135.). The advantages arising from conjoining camphor, or large doses of ammonia, or capsicum, or other stimulants, with purgatives in this disease, are manifest; for, by these or similar means, we shall succeed either in arresting its progress, or in preventing the depression which might follow copious evacuations—fears of which have paralysed the treatment of it. In all cases, but especially in diseases accompanied by low or melancholic delirium, accumulations of vitiated bile or other secretions should be suspected, and be removed: nor should we infer, from having at first failed in procuring their discharge, that no such disorder exists; for the most active, and even the most judiciously selected, cathartics may long fail in evacuating the thickened and morbid contents of the gall-bladder and hepatic ducts, particularly when their excitability has become exhausted by spirituous potations.

25. *b.* In the *second stage*—if it supervene notwithstanding the above means, or if the patient be not seen until it has appeared—the treatment should be commenced by the exhibition of the calomel, camphor, &c., as prescribed above (§ 24.), if they have not been already exhibited, or if they have not procured copious, dark, and offensive stools; and evacuations ought to be promoted by warm and stimulating aperient draughts, and by purgative enemata containing assafoetida, camphor, &c., or consisting of F. 130. 149. The greater number of the cases I have seen had been treated by able practitioners, according to the plan advised by the best writers, but without success—although purgatives had been given where the bowels had not been sufficiently open. In all these, this treatment was immediately put in practice, and assisted by cordial draughts containing some one of the ammoniated spirits, and æthers, &c., and by the enemata already alluded to. As soon as alvine evacuations were procured by these means, *opium*, either alone, or with ammonia or camphor, or with both, was prescribed in full doses, and repeated according to its effects; and although they were all severe cases, one only terminated fatally.

26. At this period of the disease, the *warm bath*, at a temperature of about 90°, will assist materially in tranquillising the patient, and promoting the effects of opium. Dr. WRIGHT, of Baltimore, strongly recommends it; but it is not a new practice in delirium tremens, as he supposes; and he is favourable to the use of Dover's powder, which, however, is more suitable to the

preceding species. Although opium should be given in full or decided doses, combined as stated above,—(in from one to three or four grains—the smaller quantity being repeated twice or thrice, the larger not oftener than once, and after a longer interval),—it should not be persisted in, unless sufficient time be allowed to elapse after each dose; for, as Dr. PEARSON has observed, if it does not succeed after its exhibition at first in a decided manner, it increases the intellectual confusion and danger. Some of the American physicians have recommended enormous doses of this medicine. Dr. S. BROWN gives from 3j. to 3ss., or even more, of laudanum for a dose. Dr. S. JACKSON prescribes from ten to fifteen or even twenty grains of solid opium every two hours; and states, that four ounces of good laudanum having been given in twelve hours, partly by mistake, a sound sleep of twenty-four hours' duration, and perfect recovery, were the result. I only am surprised that the sleep was not that of death. These are not solitary instances of the extravagance, if not rashness, of some American practitioners; nor, indeed, has the practice of giving excessive doses of laudanum in this affection been limited to them. When we find thirty or forty leeches ordered to be applied to the throat of a child five or six years old in croup, and repeated oftener even than once, and the bleeding promoted, should we wonder that death ensues? Feats of hardihood in medicine are too often the consequence of clerical and practical ignorance; and they may be allowed to meet their own reward, as long as they are not obtruded into the annals of our science, and thereby set forth to the inexperienced as examples to be followed. But when this distinction is conferred on them, it becomes the duty of those who record the progress of medicine, to note also, and to oppose, its backslidings by the severest reprehensions.

27. I believe that large and frequently repeated doses of opium in this disease, as Dr. WRIGHT, of Baltimore, has remarked, favour the supervention of coma, convulsions, or paralysis; and that the effects of an excessive quantity of this drug very nearly resemble the phenomena of the last stage of the disease, particularly towards its fatal close. This fact should not be overlooked, and should lead us to distinguish between the consequences of an injudicious treatment, and the worst features of the malady. It is the abuse of opium that is here argued against; its truly medicinal exhibition that is contended for,—in a quantity which sound sense will dictate, and after accumulated and morbid secretions and excretions have been removed, the discharge of which might be impeded or interfered with by the immediate employment of this valuable remedy. I consider opium as necessary to the cure of this disease, as bark and analogous medicines are to the cure of ague; but, as in their case, the morbid colluvies, which has at least disposed the system to be affected, and aggravated the malady, should be removed, in order that recovery may be ensured and be permanent.

28. In this stage of the disease, particularly when the delirium is attended by much agitation or violence, it is necessary to obtain an influence over the patient's mind by moral means. All irritating contentions, however, should be avoided;



and the patient's wishes, when not likely to prove injurious to him, he indulged. By thus granting what is less material, he will more readily submit to what is important; but he ought not to be left a moment without an attendant. Coercive measures will generally be found unnecessary, if soothing and indulgent but firm treatment be adopted, and the warm bath be occasionally resorted to. In a majority of instances, the above means will be followed by a remission of the symptoms, and a disposition to sleep will manifest itself,—sometimes, however, accompanied by nervous rigors. Opium should now be left off, or its dose much diminished; and the patient kept as quiet as possible. His first slumbers are often short, broken or interrupted by startings, or terminated by fright. If he awakes alarmed, his distress should be soothed, and a moderate dose of opium with warm spiced negus or punch may be given him; these will generally secure a sound sleep, from which he will awaken in a rational state of mind. Afterwards it will only be necessary to support the strength by light and nutritious diet, and gradually diminish the quantities of the restoratives that have been prescribed.

29. In cases characterised by much vital depression, very frequent pulse and cold surface occurring in old and habitual drunkards and broken constitutions, a liberal use of cordials, and even a moderate quantity of the accustomed stimulus, in addition to the opium, should be administered from time to time; particularly if the head be cool, the face pale, and the action of the carotids not strong. On the other hand, in those cases which were described (§ 15.) as approaching the first species of the disease, cupping, or the application of leeches on the occiput, or nape of the neck, or behind the ears, will be requisite early in this stage; and full doses of calomel, and the rest of the *purgative* treatment, with cold applications, or tepid affusions on the head, should be more actively employed, and precede the exhibition of opium. In this state of the disease, opium often aggravates the symptoms, unless it follow a judicious use of these remedies; and other excitants are equally injurious. In these cases, James's powder, or antimony, either previously to, or conjoined with, camphor and opium, will also be productive of much benefit.

30. That state of the disease which comes on after external injuries or operations (§ 9.), I have imputed chiefly to the previously intemperate habits of the patient. It requires the same treatment as the more nervous or vitally depressed cases now alluded to (§ 29.); and, as well as these, will be remarkably benefited by small clysters containing moderate doses of laudanum, administered after the bowels have been sufficiently evacuated, and repeated according to circumstances. This treatment has been much relied upon by M. DUPUYTREN; but if it remove not the disorder, after sufficient time has been allowed for its operation, camphor may be added to it; and ammonia, musk, ether, &c. be given in suitable vehicles; or a moderate quantity of the patient's favourite beverage allowed him, as suggested by Dr. COLLES. Of two cases recently reported (*Med. Gazette*, vol. vii. p. 287.), which confirm the view I have taken of the origin of

traumatic delirium in that state of constitution which intemperance induces, opium failed in one; and *prussic acid*, which was tried in the other, was equally unsuccessful.

31. *c.* If the *third stage* appear notwithstanding the above treatment, little hope of recovery can be entertained, as most likely serous effusion has become superadded to exhausted vital and nervous influence. Nevertheless, medical aid should not be withheld, especially if the patient have not received it in the earlier periods, or have been treated injudiciously. The hair should be removed from the head, and either a blister applied, or one of the liniments (F. 299. 308.) rubbed upon it. A blister, sinapism, or other rubefacient, should also be applied over the epigastrium; and camphor, ammonia, musk, capsicum, &c. liberally administered; restoratives and stimulants being also exhibited in clysters. Mercurial liniments containing camphor may likewise be rubbed upon the inside of the thighs, and the warm bath resorted to.

32. *d.* Certain *modes of practice* have been employed, to which a brief reference may be made. Dr. KLAPP, and some other physicians of the United States, have recommended *tartar emetic* in frequent doses, until it nauseates and purges the patient; but this treatment is more appropriate in the first species, or in such cases of the second as approach it most nearly (§ 15.). Dr. SPERANZA, of Parma (*Bullet. des Scien. Méd.* Sept. 1830.), directs leeches to the head and anus, applies ice to the scalp, and gives calomel and jalap, and subsequently *prussic acid*. This method is obviously suited only to the first species, and would be injurious in most instances of the second. From the preference he has given to the appellation adopted by J. FRANK, — *Encephalis tremefaciens*, — I would infer that he has never prescribed it in the true delirium tremens. Dr. A. L. PIERSON (*N. Eng. Journ. of Med. and Surg.* vol. ix. No. 2. Ap. 1820.) states, that he gave very large doses of *digitalis* (sixty drops every three hours) after bleeding, and the patient recovered; but this was evidently a case of this first form of the disease. Dr. PAULI informs us that he has prescribed from three to six drachms of fresh ox-gall, in aromatic water, half a glass of brandy each morning, and two grains of the watery extract of opium at night, in forty-three cases, and has lost only one (*Med. Gazette*, vol. ix. p. 776.). The propriety of having recourse to moderate quantities of the stimulus to which the patient has habituated himself, in the depressed periods of the disease, and especially in those cases which present the more marked signs of exhausted nervous and vital power, has been insisted on by Dr. BLAKE, Dr. RYAN, &c., and admitted above, as well as by others; and quinine, capsicum, the preparations of hop, and various aromatics and cordials, may be also used as adjuvants of opium.

33. *e.* During the treatment, little or no *nourishment* is desired, or even required: arrow-root and sago, with a little brandy or white wine, may however, be given from time to time, particularly if the patient wish it. When he becomes convalescent, the *diet* should be very light, but nutritious; and a suitable beverage, in moderate quantity, be allowed. During recovery, the state of the digestive functions ought to be attended



to, and promoted by tonics, and by aperients whenever the bowels are torpid. I have never known or heard of an instance wherein the state from which the patient has escaped, or the representations of the medical attendant or friends, has effected a reformation of the habits which produced the disease. However, the physician should discharge his duty, by stating to him the consequences that will accrue from persisting in them.

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DENTITION, DIFFICULT.—*SYN.* *Dentitio difficilis*, *Odontio Dentitionis*, Good. *Dysodontiasis*, Ploucquet. *Difficult Teething*.

CLASSIF.—1. Class, 1. Order (Good).

II. CLASS, I. ORDER (Author).

1. DEFIN.—*Slow or delayed evolution of the teeth, with signs of local irritation, and constitutional disturbance, often with disorder manifested especially in the digestive organs and nervous systems, occurring chiefly in weak or over-fed children.*

2. A general view of the pathological relations of dentition was exhibited in the article AGE (§ 10.); and, therefore, only that morbid condition of the process which is unattended by disease of an important organ, and is referrible chiefly to this process itself, although often causing disease, or being accidentally associated with it, will be here noticed.

3. i. Dentition, in the most favourable cases, is preceded by slight salivation, by heat and fulness of the gums, occasional flushings, increased thirst, restlessness or fretfulness, and frequent endeavours to thrust things into the mouth, evidently to allay irritation or itching. These symptoms generally appear about the third or fourth month, and precede the appearance of the teeth sometimes by several weeks; and occasionally subside, and reappear shortly before the tooth makes its way through the surface. These signs of disturbance are merely the necessary attendants on the formative processes going on in the gum. But very commonly in children of deficient vital power, and occasionally in those which are apparently robust, or rather plethoric from overfeeding, dentition is either delayed, or is attended by more serious disorder, particularly while the canine teeth are being protruded. In delicate children, particularly those living in crowded towns, and low and ill-ventilated localities, this process is

both late and slow in taking place, and is often attended by signs of increased irritation, as redness or tumefaction of the gums; by various cutaneous eruptions; by greater fretfulness, sometimes sickness and feverishness towards night, with restlessness, fits of crying, and sudden startings from sleep. These may be the only ailments, which may subside either partially or altogether as soon as the tooth has passed the surface, and return shortly before others come in sight; but not infrequently, particularly in this class of patients, disorders of the prima via, particularly chronic diarrhoea, slight dysenteric affections, or slow remitting forms of fever, obstruction or enlargement of the mesenteric glands, obstinate and recurring coughs, tubercular degeneration in the lungs or digestive tube, marasmus, &c., supervene more or less rapidly.

4. ii. In children who are of a plethoric rather than of a robust habit of body, and which Dr. J. CLARKE has, with much justice, ascribed to overfeeding, the gums are often swollen and painful, the face flushed, the head hot and pained; and all the symptoms of inflammation of the membranes of the brain, or of inflammatory fever with determination to the encephalon, frequently supervene. In them, the symptomatic fever is generally high, and attended by great thirst, nausea, vomitings, constipation, and occasionally by drowsiness or stupor, or by great irritability and restlessness, or by both states of disorder alternately; sometimes by short broken slumbers, from which the child awakens in a state of alarm, or in a fit of crying; or by convulsions, diminished secretion of urine, and other signs of cerebral affection. These are the usual concomitants and symptoms, or consequences, of difficult dentition; but they do not always stop here; for they often run on into more serious disease,—such disease, however, occasionally appearing more abruptly and without these precursory ailments, at least in such degree or duration, as to become objects of attention to the attendants, or to lead them to resort to medical aid. These maladies, although often occasioned either partly or chiefly by dentition, when occurring in children at that epoch; and whether affecting the cerebral, the thoracic, or the abdominal organs, or the skin; are still more frequently independent of this process, and therefore cannot be further alluded to in connection with it, than they have already been in another place (see AGE, § 10.);—and, indeed, in most instances in which a close connection between them and difficult or morbid dentition is observed, it is that of concurrent effects of constitutional predisposition and of anterior changes in the organic functions; the local irritation and sympathetic febrile disturbance either exciting morbid action in such organs or tissues as, from hereditary conformation or vice, are disposed to it; or aggravating previously existing disorder, and rendering evident what was before latent, or unobserved. In these cases, therefore, dentition is to be looked upon either as a principal, or as a concurrent exciting cause of many of those diseases which occur at the period of dentition,—but a cause most frequently concurrent with improper feeding and clothing.

5. iii. A natural or slightly difficult dentition may be converted into serious disease, by the not



uncommon habit of giving the infant food whenever it cries from the irritation attending upon the process, and thereby overloading and further disordering the digestive processes, which are already disordered by the febrile disturbance generally accompanying it; whilst determination of the circulation to the head is favoured by the practice of covering the head in-doors or when asleep, and by wearing thick felt hats during mild or warm weather. BRANDIS believes that difficult dentition is the consequence of obstruction of the salivation which accompanies, and is salutary in, this process: HECKER, that it results from a morbid state of this secretion: MYLIUS, that it is the effect of disorder sympathetically induced in the liver: THOM, that dentition often occasions an acrimony of the abdominal secretions, which react upon the original seat of disorder, and upon the system generally; thereby rendering it difficult or morbid: WIGAND, that the affections attending, delaying, and otherwise disordering, this process, are accidental complications merely; and JOHN CLARKE, that all such disorders are commonly the consequences of plethora arising from over-feeding. Now, in all these opinions, there is much truth; and one or other, or several of them, obtain in many instances, more, however, as contingent and related effects of the local irritation, than as causes of the difficulty of the process,—which irritation is the chief or concurrent cause of febrile disturbance, of disordered function, and at last of more palpable disease, according to the condition of particular organs at the time, and constitutional or acquired predisposition.

6. iv. The *irruption* of the *second* or permanent teeth may also be delayed or attended by sympathetic disorders, particularly in persons whose *maxillæ* are insufficiently developed, and when the *dentes sapientes*, and the canine teeth, are appearing. In delicate, nervous, and irritable subjects, swelling of the parotid and sub-maxillary glands, painful and sometimes periodic affections of the ear or face, slight or recurring ophthalmia, irregular convulsions, or epilepsy, and chorea, have, in some instances, been excited by this cause; and have disappeared upon the eruption of the teeth, or the removal of the local irritation.

7. v. The *TREATMENT* of difficult dentition should be directed with the intention—1st, of removing the local irritation; and, 2d, of subduing the sympathetic disorders associated with it.—*A.* The local irritation requires scarification of the gums whenever they are at all swollen or red; and particularly in the second stage of the process, when the tooth has reached the surface, whether there be redness and swelling, or not. The propriety of this operation has been, however, called in question, particularly by STERNBERG, STORCH, THOM, and BRANDIS, on the plea of its inutility, of it occasioning ulceration or disease of the capsules of the teeth, and of the cicatrix which is soon afterwards formed being absorbed with greater difficulty than the other parts. But these are by no means valid objections—for its utility has been proved by the experience of HARRIS, COWPER (*Anat. of the Hum. Body, &c.*), BROMFIELD (*Observations, &c.* vol. ii. p. 17.), BERDMORE (*Treatise on the Teeth, &c.* 8vo. Lond. 1770.), HURLOCK, RIEDLIN, WEDEKIND, KENNEDY, MARLEY, myself, and most modern writers of experience: and, as to the contingent ulceration of the gums, it seldom or

never occurs when the operation is judiciously performed; when the lancet is clean, not carried too deep into the gum, if lancing be performed early in the process; and when its edge is directed rather outwards, as recommended by Mr. MARLEY. That the cicatrix may oppose the passage of the tooth is certainly not proved; but this, if it did, is no objection, as a repetition of the operation, is often necessary, and generally beneficial. M. BROUZET (*Sur l'Éducat. Médic. des Enfants*, t. i. p. 234.) advises the surface of the gum to be divided, from time to time, by the point of the nail,—a practice which possesses the advantage of not alarming the child, of being easily and readily performed, and of delaying the closing of the divided part. But care should be taken not to perform it until the nails have been well cleaned.

8. The propriety of allowing the infant to rub the gums with hard substances has been questioned by AUZEBI, MARLEY, and others, from an idea that they will hereby become more callous, and absorbed with greater difficulty. But the truth of this is questionable. I believe that substances pressed frequently between the gums, materially lessen the irritation and distressing itching felt in them, and promote the flow of saliva,—results of no mean importance in preventing the supervention of sympathetic disturbance. These results will be ensured, in cases of existing irritation, by frequently moistening whatever substance is thus employed with borax mixed in a little syrup of senna.

9. Besides the above, various other means have been recommended in order to subdue the local irritation: the chief of these are—a preservation of a lax state of the secretions and bowels; leeches, particularly behind the ears (SYDENHAM, KORTUM, STOLL, LEROY, *Journ. de Paris*, 1784.); internal emollients (PAULUS ÆGINATA, l. i. cap. 9., and BEKKER, *Hermet. Rediviv.* p. 705.); various derivatives (HUFELAND); calomel (MYLIUS and others); the alkalies (HECKER); cold applied to the face (WIGAND); opium (WEDEKIND); and active purging (VANDERMONDE and PORTAL, *Anat. Médicale*, t. i. p. 211.). The best means of promoting the secretions and alvine evacuations are, small doses of hydrarg. cum creta, conjoined with the dried sub-carbonate of soda, and, if the state of the bowels requires it, with the pulv. jalapæ, given every night. Leeches behind the ears, and cold applied to the head, should never be neglected whenever the temperature of this part is increased, and other signs of determination of the circulation to it are observed. In such cases, active cathartics, calomel with James's powder, and the rest of the treatment recommended for cerebral diseases, are necessary. Blisters applied also behind the ears are the best external derivatives; but they should be removed as soon as redness is produced. Opium is very seldom admissible; but, if much irritation exist, the tepid bath and syrup of poppies, with small doses of the sub-borate or the sub-carbonate of soda, may be prescribed. If the gums become ulcerated, borax, or sulphate of alumina, or the boracic acid, in honey or syrup of roses, should be employed.

10. *B.* The *sympathetic disorders* should be subdued as soon as they appear.—(a) If the head indicate vascular excitement, the means already specified (§ 6. 8.) should be directed; and if



the symptomatic fever, with or without determination to this quarter, be considerable, cooling aperients, and saline and antiphlogistic diaphoretics, are requisite, with the cold affusion on the head, the tepid bath, &c.—(b) Constipation, or colicky affections, which are not infrequent during this epoch, should receive immediate attention; and aperients, emollient laxatives,—as castor oil with two or three drops of oleum anisi, hydrarg. cum creta with sub-carbonate of soda,—and, if requisite, purgative and antispasmodic enemata, ought to be prescribed.—(c) Care ought to be taken not to check a slight diarrhoea; but if it passes beyond this, emollients, demulcents, refrigerants, diaphoretics, alteratives, tonics, absorbents, &c. should be prescribed, according to the circumstances of the case, and be assisted by the semicupium, warm clothing on the lower part of the body, and occasional doses of rhubarb with magnesia and hydrarg. cum creta.—(d) In some cases, both vomiting and purging, or a slight form of cholera, or of choleric fever, supervene; the stools being greenish, spinach-like, and offensive, sometimes terminating in a gelatiniform softening of the mucous surface of the stomach and bowels, as described by M. CRUVEILHIER; but more frequently without such disorganisation, as M. GUERSENT has remarked. The classes of remedies just now particularised are also admissible in this affection. (See CHOLERIC FEVER OF INFANTS, and DIARRHŒA.)—(e) Watchfulness, irritability, frequent startings from sleep, with crying, &c. should always be dreaded, especially when the canine or anterior molar teeth are about to appear, as not infrequently being the precursors of convulsions, and indicating much sympathetic irritation of the nervous system with disorder of the digestive organs, and excited circulation in the encephalon. On the other hand, somnolency, particularly in plethoric children, evinces congestion within the head, which may be readily converted into inflammatory action; or it may terminate in effusion of serum: and either condition may usher in *convulsive spasm of the larynx*, the nature and morbid relations of which have been so little understood. In all these varying states and relations of disease, leeches applied behind the ears, lancing the gums, purgatives, emollients, refrigerants, a cautious exhibition of narcotics, laxative and antispasmodic enemata, the tepid bath, cold or tepid affusion on the head, rubefacient and anodyne liniments (F. 298. 308. 311.) rubbed along the spine, and, in delicate children, gentle tonics, are requisite, and should be modified according to the habit of body, and the particular features of the case. (See CONVULSIONS in Children; and LARYNX—*Convulsive Spasm of*.)—(f) The occurrence of obstinate coughs at this period should suggest attention to the state of the gums, with the use of demulcents and emollients, conjoined with laxatives, external derivatives, and diaphoretics. Leeches, also, ought to be resorted to, if the cough be attended by heat of skin, quick pulse, accelerated respiration, or if the child be plethoric.—(g) *Eruptions*, also, on the head, behind the ears, or on any part of the surface, ought not to be suppressed by external applications; but the functions of the abdominal and depuratory organs ought to be promoted by alteratives

and gentle aperients, and the utmost cleanliness of the skin preserved.

11. C.—(a) During dentition, the head should be washed with cold water night and morning; and no other covering than that with which nature has provided this part should be put upon it when within doors or asleep; and on no occasion should warm felt hats be worn, thin straw or white hats being lighter and cooler.—(b) The diet should be carefully attended to, and that only allowed which is easily digested; and even it ought to be taken in moderate quantity. The child ought also to be much in the open air; and, if the process threaten much constitutional or local disease, an entire change of air will often be advantageous.

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DIABETES. *Excessive Secretion of Urine*.—

SYN. Διασηρής (a siphon; or from διασαίρω, transeo). Lienteria Urinalis, Tabes Urinalis, Diarrhœa Urinosa, Hydrops ad Matulam, Pro-fluvium vel Nimia Profusio Urinæ, Cito Emissio-  
Rerum quæ bibuntur, Auct. Vet. Polyuria, Seidel. Diabetes Anglicus, Mead and Sauvages. Phthisuria Saccharina, Diabetes Saccharina, Nicolas, Gueudeville, Hufeland. Diabetes Mellitus, Cullen and Sagar. Dipsacus, Hecker. Phthisuria, Reil. Harnfluss, Honigartige Harnruhr, Germ. Urinflod, Dan. Diabète, Fr. Flosso d'Orina, Ital. Urine-Flux.

CLASSIF.—2. Class, Nervous Diseases; 3. Order, Spasmodic Disorders (Cullen). 6. Class, Disease of the Excreting Function; 2. Order, Affecting Internal Surfaces (Good). I. CLASS, II. ORDER (Author, in Preface).

1. DEFIN.—Urine secreted of a sweet taste and violet smell, generally in large quantity, with great thirst, dryness of skin, debility, and emaciation.

2. This disease was but slightly alluded to by CELSUS. ARETEUS gave a tolerably complete history of it, which the majority of his followers merely copied. ALEXANDER OF TRALLS added



nothing to either its pathology or treatment, excepting the drawing of a comparison between it and lientery; and AËTIUS, taking up the same idea, states, that the one affection differs from the other in as far as that the undigested aliments pass off, in the former by the urine, in the latter by the stools; an opinion which was afterwards adopted by FERNEL, DURET, ZACUTUS-LUSITANUS, and others. But WILLIS was the first who advanced a rational theory of the disease. Since his time, opinions as to its pathology have been various, and the remedies recommended still more diversified.

3. Even up to the present day, the term *diabetes* has been applied to various states of disease:—1st. To that consisting chiefly of *diuresis*, or morbidly increased flow of urine, without reference to its quality; 2d. To that in which the urine is voided not only more frequently, and in larger quantity than natural, but also of changed quality, as respects certain of its constituents, viz. albumen and urea, either of which may be in excess; and, 3d, to that in which a saccharine matter is either superadded to the other ingredients contained in the urine, or in part replaces them. To the last of these morbid states I shall limit the term diabetes, conformably with the views of Dr. PROUT and M. RENAULDIN. The other morbid conditions of the urine will be noticed when treating of the pathology of this secretion. (See URINE.) Restricting, therefore, the term diabetes to that state of the urine characterised by the presence of saccharine matter, I have defined it accordingly. In consequence of the very vague ideas which have but too generally been entertained both as to the phenomena requisite to constitute this malady, and as to its various morbid relations, diabetes has generally been considered with reference to the quantity of the fluid secreted, without regard to the circumstance alluded to by Dr. PARR and others, and judiciously insisted on by Dr. PROUT, that the disease may exist for a long time, and the urine be extremely saccharine, without much, or even any, increase of its quantity; and, when the urinary discharge is augmented much beyond natural, that it is much easier to reduce it even to the usual quantity, than to restore it altogether to its natural quality.

4. SYMPTOMS.—A. The *urine* of diabetic patients is generally of a pale straw or greenish colour; of a faint and peculiar odour, sometimes resembling that of sweet whey or milk, or of violets. Its taste is always more or less saccharine; and its specific gravity usually varies from 1.025 to 1.052. The quantity of urea is generally much diminished in diabetic urine: Dr. PROUT and Dr. HENRY have never observed it altogether absent; and there is little or no lithic acid. The usual saline ingredients in healthy urine exist in the urine of diabetes, but in diminished quantity, whilst their relative proportions continue nearly the same. Dr. WATT has found a little blood in it; but this is a rare occurrence: it much more frequently contains albuminous matter analogous to that of chyle. Dr. HENRY has given a useful table, showing the quantity of solid extract in a wine pint of urine of different specific gravities from 1.020 to 1.050. The following abstract of this table will enable the reader to ascertain the quantity of solid matter diabetic urine may contain:—

| Specific gravity compared with 1000 parts of water at 60°. | Quantity of solid extract in a wine pint. | Quantity of solid extract in a wine pint, in |
|--|---|--|
|  | grains.                                   | oz. dr. scr. grs.                            |
| 1020   | 382.4                                     | 0 6 1 2                                      |
| 1021   | 401.6                                     | 0 6 2 1                                      |
| 1022   | 420.8                                     | 0 7 0 0                                      |
| 1023   | 440.0                                     | 0 7 1 0                                      |
| 1024   | 459.2                                     | 0 7 1 19                                     |
| 1025   | 478.4                                     | 0 7 2 18                                     |
| 1026   | 497.6                                     | 1 0 0 17                                     |
| 1027   | 516.8                                     | 1 0 1 16                                     |
| 1028   | 536.0                                     | 1 0 2 16                                     |
| 1029   | 555.2                                     | 1 1 0 15                                     |
| 1030   | 574.4                                     | 1 1 1 14                                     |
| 1031   | 593.6                                     | 1 1 2 13                                     |
| 1032   | 612.8                                     | 1 2 0 12                                     |
| 1033   | 632.0                                     | 1 2 1 12                                     |
| 1034   | 651.2                                     | 1 2 2 11                                     |
| 1035   | 670.4                                     | 1 3 0 10                                     |
| 1036   | 689.6                                     | 1 3 1 9                                      |
| 1037   | 708.8                                     | 1 3 2 8                                      |
| 1038   | 728.0                                     | 1 4 0 8                                      |
| 1039   | 747.2                                     | 1 4 1 7                                      |
| 1040   | 766.4                                     | 1 4 2 6                                      |
| 1041   | 785.6                                     | 1 5 0 5                                      |
| 1042   | 804.8                                     | 1 5 1 4                                      |
| 1043   | 824.0                                     | 1 5 2 3                                      |
| 1044   | 843.2                                     | 1 6 0 3                                      |
| 1045   | 862.4                                     | 1 6 1 2                                      |
| 1046   | 881.6                                     | 1 6 2 1                                      |
| 1047   | 900.8                                     | 1 7 0 0                                      |
| 1048   | 920.0                                     | 1 7 1 0                                      |
| 1049   | 939.2                                     | 1 7 1 19                                     |
| 1050   | 958.4                                     | 1 7 2 18                                     |

This table enables us to ascertain with considerable precision the quantity of solid matter voided by a diabetic patient in a given time. Thus, suppose 10 pints are passed in 24 hours, of the average specific gravity 1.040, it is evident that this will contain  $10 \times 1.4..2.6 = 15..7..2$ , or upwards of a pound and a quarter of solid extract.

5. Besides the *saccharine* condition of the urine, the next most striking and constant symptom is its *increased* quantity. Sometimes the quantity voided is enormous. P. FRANK details a case in which 52 lbs. were passed in twenty-four hours; and instances are by no means uncommon of from twenty-five to thirty-five pints having been discharged in the same time for weeks, or even months together. In some cases the urine has been said so have been nearly double the quantity of the whole ingesta,—a circumstance which has puzzled physiologists to explain, and has induced some to believe that, in addition to the colligation of the solids of the body, absorption of moisture from the air actually takes place during the disease in some cases, either through the medium of the respiratory organs or cutaneous surface, or both. I believe, however, that so great a difference between the quantity of the ingesta and urine, as here stated, is extremely rare; although a considerable excess has been proved by Dr. BARDSLEY; and the experiments of modern physiologists have shown that the lungs may absorb moisture from the atmosphere, although the skin may be incapable of doing so.

6. B. The *constitutional symptoms* are often ushered in by weariness and aversion from any exertion; by dryness and disagreeable taste in the mouth, the saliva becoming white and frothy; and by a sense of weight, heat, or pain, in the epigastrium, accompanied with alternate chills and flushings, or burnings of the palms of the hands and soles of the feet. To these supervene dryness of the skin, much thirst, costiveness; a saccharine state of the urine, with, and sometimes without, an increased secretion of it; a craving



appetite, and all the symptoms constituting the disease. In many cases, the urine has evidently been saccharine, without much increase in its quantity, long before the attention of either the patient or practitioner had been directed to this secretion. In other cases, the disease attacks more suddenly, generally with dryness of the mouth and throat; dry skin; a feeling of heat and pain in the epigastrium, occasionally with headach, commonly with aching of the back and loins, and pain in the course of the urinary passages; sometimes, as mentioned by BALLONIUS, a sense of cold in the loins is complained of. The urine generally, now much increased in quantity, presents the appearances already described, and deposits no sediment. The breathing is short, sometimes difficult or oppressed, with a short tickling cough; sometimes muco-puriform expectoration, and flying pains through the chest. The desire for drink and food increases; the skin becomes rough or scaly; the tongue either loaded with a dark-coloured fur, particularly at its base, or unnaturally clean, and of a dark red, or purplish red hue; the mouth foul, dry, and clammy; the bowels constipated, the evacuations being difficult, painful, dry, and often without their natural odour. A hay-scent sometimes issues from the body, as first noticed by Dr. LATHAM, and a similar halitus occasionally from the lungs. As the secretion of urine increases, the thirst and hunger become intolerant, and, in some cases, the latter amounts to complete pica, as stated by SPRENGEL. The sense of heat and burning at the epigastrium is exasperated, and extends in the direction of the urinary passages, frequently with phymosis, and some degree of uneasiness or inflammation about the external orifice of the urethra. The secretion of the prostate—but not the semen, as loosely stated by some writers—is sometimes voided after the discharge of urine; and the patient loses his sexual propensities and powers. To these symptoms are generally added, chilliness, and great sensibility of cold; cold extremities, often alternating with burning of the soles of the feet, and slight œdema; acid eructations, flatulence; painful muddy eyes; indistinct vision; headach or vertigo; dyspnœa or cough; and weariness on the least exertion; a sense of sinking at the epigastrium; weight and tenderness about the præcordia; frequent sighing; listlessness; a weak, forgetful, distrusting, anxious, wavering, and peevish state of mind; and great depression of spirits. As the disease advances, the debility and emaciation increase. The skin becomes rugous and scaly, particularly over the abdomen; and the veins large and distended. The fauces and tongue now assume a dark red tint, and are unnaturally clean; the gums spongy or partially absorbed; the teeth loose, and the breath foetid. In some cases, aphthæ appear in the mouth, and the gums ulcerate. The pulse is at first but little affected. Occasionally it is somewhat hard or frequent, particularly after a meal, or during the febrile exacerbations which usually occur in the advanced state of the malady. In the last stages, the pulse is often quick, sharp; or weak, small, and compressible. It is, however, very variable in different cases, or even in the same case.

7. C. The blood taken in the progress of the disease generally separates into a loose, dark

crassamentum, containing a smaller proportion of fibrine than the clot of healthy blood; and a whitish or light-coloured serum, resembling whey. Its analysis has been made by several eminent chemists, with the view of detecting saccharine matter in it. NICOLAS and GUEUDEVILLE considered it less animalised, and to contain a smaller quantity of fibrine, than healthy blood; but they found no saccharine matter. WOLLASTON, MARCET, HENRY, and PROUT, also failed in finding any of this matter in the serum; whilst RICHTER conceived that he could detect it by the taste, and, with many other pathologists, believes that it exists in small quantity in the blood, from which it is so constantly eliminated by the action of the kidneys, as never to accumulate to the extent of being detected by chemical agents; or that it is concealed by its combination or admixture with albumen.

8. ii. COMPLICATIONS.—I have scarcely met with a case of this disease which was entirely uncomplicated with pulmonic symptoms; and a similar remark has been made by Dr. BARDSLEY. On this account I conceive that the appellation given to the disease by NICOLAS and GUEUDEVILLE, of *Phthisurie Sucrée* to be extremely appropriate. It should, however, be conceded, that, in many cases, other organs participate in functional, and even in organic disease, particularly the digestive mucous surfaces, and the liver. Indeed, it may be often looked upon as a result of a breaking down of the system, often in consequence of intemperance and illicit indulgences, and exhaustion of the vital energies and assimilative functions, whereby several, or even all, of the organs concerned in the perpetuation of life suffer more or less.

9. iii. TERMINATIONS.—If unchecked by treatment, the debility increases, and pulmonic symptoms, with hectic fever, if they have not already existed, seldom fail of appearing. Occasionally the disease passes into incurable dropsy. Not infrequently the discharge is much diminished, and more urinous, for a short time before death; and, in some instances, the patient is suddenly cut off either by apoplexy, or, as observed by Dr. PROUT, by a peculiar affection of the stomach occasioned by improper food, or by overdistension of this viscus from the excessive quantity of solid and fluid ingesta.

10. iv. DURATION.—Diabetes generally continues for an indefinite time, according to the suddenness or acuteness of the attack, the previous health of the patient, the nature of the exciting cause, the form of the complication, the diet and regimen prescribed, and the means of cure employed. It is always exasperated during cold and moist weather. FRANK states, that it is also worse in autumn. HECKER, THENARD, and DUPUYTREN, have known it to continue, with intervals of improvement, for many years; and OOSTERDYCK states that he treated a case that terminated unfavourably in a few days. When the issue is fatal, it commonly runs its course in a few months, and is seldom of shorter duration than several weeks. I believe that the disease not infrequently exists, for a considerable time at least, without any very sensible increase of the quantity of the urinary discharge, and that it is hence often far advanced before it comes before the physician; and that many cases which have been



believed or stated to have been cured, have experienced merely a temporary benefit,—the malady returning in all its severity from the slightest exposure to its more common exciting causes, or the least want of attention to the requisite diet and regimen.

11. v. ORGANIC CHANGES are by no means constantly observed after diabetes, even in the *urinary organs*; and, when present in them, are not such as may account for the disease; but, as HECKER has justly contended, are rather its effects than its causes. RUTHERFORD, HOME, DUPUYTREN, SEGALAS, and DEZEIMERIS, have found the *kidneys* somewhat enlarged and vascular. BONET, MORGAGNI, MONRO, HERTZOG, CAWLEY, DESAULT, and HECKER, have observed them only more flaccid than natural: and CRUICKSHANKS, REIL, RUTHERFORD, DUNCAN, and BAILLIE, have remarked merely a more turgid state of their blood-vessels; which FRANK and VETTER have stated to have been more lacerable than in the healthy state. In rarer instances, one or even both kidneys have been observed much smaller than usual (P. FRANK, MÜLLER). Hydatids have been found, by BEER, filling and distending them enormously; and calculi have been detected in their pelvis by BAILLOU. RUYSCH and HECKER met with cartilaginous induration of their envelopes and cortical substance; and BRODIE found their structure hard and gristly. MÜLLER mentions enlargement of their nerves; and DUNCAN states that the splanchnic nerves were all enlarged to three or four times their natural size, in a case he has recorded. CONRADI observed the pelvis of the kidneys enlarged so as to contain a small orange; and RUYSCH, RUTHERFORD, REIL, HECKER, and CLARKE, remarked considerable dilatation of the ureters. Increased size of either the pelvis of the kidneys, or of the ureters, or urinary bladder, or even of them all, is not infrequent. In some instances, the bladder is thickened, or contracted, and slightly inflamed, and the prostate enlarged. All the urinary organs, however, have been found as frequently natural, even by the authors now mentioned, as presenting the above changes.

12. Next in frequency to enlargement and flaccidity of the *kidneys*, the *mesenteric glands* have presented morbid appearances. MASCAGNI, JUNCKER, HIMLY, REIL, HOME, CAWLEY, and HECKER, have found them enlarged, obstructed, and otherwise changed; but they also have been met with perfectly natural, by the same authors, as well as by others. RUTHERFORD and MONRO have observed enlargement, softening, and increased vascularity of the absorbent glands generally. The thoracic duct has, in a few instances, been found greatly enlarged and dilated. The *lungs* are, perhaps, as frequently diseased as any other organ. I have never seen a case examined in which they were perfectly healthy. LUROTH, SEGALAS, DUPUYTREN, and HORN, have severally observed tubercles in every stage of their progress; ulcerations, tubercular excavations, hepatisations, and purulent collections or disseminated vomicæ, in the lungs, as well as inflammation of the pleura, and its consequences—adhesions of the pleura, &c., of the pericardium and pleura, serous effusion into the pleural cavity, &c. M. LUROTH detected, in addition to hepatisation of, and ex-

cavations in, the lungs, aneurism of the pulmonary artery, the kidneys being sound. Similar states of the pulmonary artery, lungs, and kidneys, were found in a case recorded by M. LOBSTEIN; the lungs being extensively tuberculated, hepatised, and adherent to the thorax, without any manifest thoracic symptoms during life. The *digestive organs* have been next most frequently diseased. DUPUYTREN and SEGALAS have observed a more vascular state than natural of the digestive mucous surface, but without any organic change of the stomach, or intestines, beyond dilatation of the former, and of the duodenum. RUTHERFORD and BAILLIE always found the stomach healthy. The *liver* is more frequently diseased. MEAD states that it was always altered in structure; whilst CULLEN, FRANCK, and HOME, generally observed it natural. CAWLEY and HECKER have commonly detected organic change of this viscus. The *spleen* and *pancreas* have seldom presented any lesion. MICHAËLIS, CONRADI, and HECKER, detected chyle imperfectly mixed with the *blood* in the large vessels and cavities of the heart; and the same authors, and MARSHALL, remarked a chocolate appearance of the blood in all the vessels. Dr. RUTHERFORD states that the blood was black and fluid in all the cases he inspected. In the cases I have seen examined, the mucous surface of the stomach, and of the upper parts of the small intestines, was rugous and vascular. The lungs were congested or hepatised, or tuberculated and excavated, or their pleuræ adherent. The heart was flaccid, soft, and small; the blood dark and semi-fluid; the kidneys congested with dark blood, and somewhat large; the super-renal capsules somewhat indurated; and the renal ganglia more than usually large. But these changes were not uniformly observed; several of them were wanting; and in one or two instances, no decidedly morbid change was detected. Upon the whole, therefore, *post mortem* research has thrown but little light on the nature of diabetes, further than showing that it is the result of a morbid condition of several, if not all, of the assimilating and excreting viscera, and not of any one of them.

13. II. PROGNOSIS and DIAGNOSIS. — A. Although patients whose constitutional powers are not greatly reduced, may sometimes live for many years, under judicious treatment, in this disease, yet should the *prognosis* be upon the whole very unfavourable: a cure may, however, be effected by appropriate means adopted early; but this result is comparatively rare, and should never be considered as perfect, unless the healthy quality, as well as quantity, of the urine be altogether recovered, and the strength and bulk of the body be restored. Partial, or even very great, relief is often afforded; but the malady after a while returns, and may proceed without admitting of relief to a fatal issue, or be again and again checked by treatment. Much depends upon the patients themselves, and the strictness with which the prescribed regimen is followed; for, as the disease often originates in excesses, a return to them upon partial, or tolerable, recovery, will bring back the disease. When we find it complicated, as it most commonly is, with organic disease of the lungs, liver, or lymphatic system, a favourable issue cannot be expected. Out of from twelve



to fifteen cases I have treated, I know of two only at the present time that have perfectly recovered. One of these, a married woman, who had previously been attended by an eminent writer on the disease, has continued perfectly well for six or seven years; but although not yet thirty-five, the catamenia, which had disappeared before the development of diabetes, has not returned. The chances may, perhaps, be estimated at about five or six, or even higher, against the patient; but much will depend upon the quantity and quality of the urine, the progress of the disease, the age, visceral complications, constitutional powers, the state and functions of the skin, the degree of emaciation, and circumstances and character of the patient. I believe that the prognosis should be much more unfavourable where the urine is mellitic, than when it is not so changed, however abundant it may be.

14. *B.* The *Diagnosis* of diabetes mellitus is very readily formed from the sensible properties of the urine. (See the *Symptoms*, § 4.; and art. URINE.)

15. III. CAUSES.—*A. Predisposing.* Hereditary predisposition to this disease has been remarked by several authors. Dr. PROUT has observed it in four instances. ISENFLAMM states that he knew of seven of the descendants of a diabetic patient, who died of the malady. MORTON, BRISBANE, ROLLO, BLUMENBACH, FRANK, STORER, and CLARKE, also furnish similar facts. Diabetes is more frequently met with in the male, than in the female sex; and in persons who either are past the period of puberty, or are advanced in years. The true diabetes mellitus is rare in children, whilst albuminous urine and enuresis are frequent complaints in them. It is much more common in cold and moist countries, particularly those in which the inhabitants live chiefly on rye, or any other vegetable food, or are imperfectly nourished, than in warm and dry climates: and is hence oftener met with in Great Britain, Ireland, Holland, Denmark, and Sweden, than in France and Germany; and in the western, than in the eastern side of this island. J. FRANK states that he saw a greater number of cases of it in Italy, than in any part of Germany. Dr. CHRISTIE observed it more frequently amongst the inhabitants of Ceylon, than in any part of continental India; and imputes it to the moist state of the atmosphere, and their poor vegetable diet. The scrofulous diathesis also predisposes to it.

16. *B.* The *Exciting Causes* are not so precisely ascertained as the predisposing, and their connection with the origin of the disease not so obvious as could be desired; but the following, acting either individually or in conjunction, particularly in the latter mode, may be considered as most commonly productive of diabetes, where a predisposition to it exists, either hereditarily, or from visceral disease:—Continued or repeated exposure to cold and moisture; drinking cold fluids when the body is over-heated; suppression of an habitual perspiration, by whatever means; acidulous or fermented liquors, particularly in malt liquors, cyder, &c.; the exhaustion arising from excessive evacuations and morbid discharges, or from undue sexual intercourse; great bodily and mental exertions; the depressing passions, such as anxiety, disappointment, &c.: and

whatever occasions great exhaustion of the powers of life, and of assimilation, is sometimes productive of this malady. Besides these, authors have adduced others as its occasional causes. AUTENREITH mentions the use of acids and acidulous fluids; BOERHAAVE, LISTER, STEDMAN, and FRANK, the abuse of diuretics and diluents; SYDENHAM and SENAC, excessive horse exercise; RUYSCH, CHESelden, and LATHAM, the existence of chronic abscesses and carbuncles; FRANK, the carrying of heavy weights; BENNEWITZ (*Ossann's Jahresbericht*, &c. July, 1828.) relates the case of a female who was affected by the disease during two successive pregnancies; PLOUCQUET and others have observed it result from falls, and injuries on the back, loins, and hips; and BAILLOU, BRENDel, WEBER, LANZONI, and FRANK, the drying up of chronic eruptions, exanthemes, fluor albus, &c., or the suppression of hæmorrhages. It may be suspected, however, of the last named phenomena, that, instead of being causes of the disease, they are actually the effects resulting from the internal changes constituting its early stages—diabetes, or the internal changes leading to it, having commenced previously to the disappearance of the external disorders—for it has been often remarked that sores heal rapidly during the disease. Diabetes may, indeed, be frequently considered a remote effect in the chain of morbid causation; functional or even structural change of the assimilating viscera, particularly the lungs and digestive organs, existing for many months, or even years, before the increase, or the saccharine state, of the urine has attracted attention.

17. *C.* The *proximate cause* of diabetes is still extremely obscure, although several authors of deserved reputation have endeavoured to explain it.—1st. It has been ascribed to a morbid condition of the kidneys. This is the oldest opinion that has been entertained respecting its nature. The Greek writers considered diabetes to be owing to relaxation, debility, and increased irritability of these viscera; the irritability being, as they supposed, the cause of their morbid activity; and the relaxation and debility allowing the more liquid parts of the blood to pass through the excretories without restraint or change, and, consequently, in a crude state, like the food in lenteria. The supporters of this doctrine adduce, in proof of it, those morbid changes that have been observed in the kidneys, without agreeing amongst themselves as to the particular changes which really constitute the disease. Some consider that they are essentially inflammatory. But they overlook the facts, that decided and unequivocal marks of inflammation of the kidneys are seldom found in diabetes; and that when these marks are observed in other diseases, they have uniformly been accompanied by a diminished, or an entirely suppressed, instead of a more profuse, secretion of urine. Others, who conceive that diabetes is a disease seated in the kidneys, ascribe it to spasm, without stating in what tissues, or vessels, this spasm exists; and even without mentioning precisely whether the spasm is in the vessels of the kidneys, or of other parts. CAMERARIUS first proposed this doctrine, in which he was followed by CULLEN, who afterwards abandoned it, and ascribed it to "some



fault in the assimilatory powers." GUEDEVILLE, likewise, partially adopted this opinion, but conjoined it with another which I shall have to examine in the sequel, and stated that this disease "is a consumption arising from a continual spasmodic deviation of the unassimilated nutritive juices to the urinary organs." Here, however, the spasm is not ascribed to the tissues of the kidneys, and we are left quite in the dark as to the parts thus spasmodically affected. But amongst the various supporters of the doctrine that the kidneys are the seat of diabetes, there is not one who has attempted to name the specific affection or state of those organs which constitutes the disease. RUYSCH, RITTER, STOELLER, CRUICKSHANKS, RICHTER, and GOOD, have considered it as resulting from a morbid affection of the kidneys; and several of them, besides others whom it is unnecessary to adduce, have contented themselves merely with stating this very vague opinion. STOELLER and RICHTER, however, conjoin this undefined "morbid affection" with depraved function of the skin; and GOOD considers that the morbid state is one of excitement. He remarks that the whole of the phenomena, observed during the progress of diabetes, are consequent upon the renal mischief, and that it is a much less complicated disease than has hitherto been imagined. How far this is correct, the experienced practitioner may decide for himself; but it is certainly not in accordance with my observations, nor with the closest attention I have been able to give the subject. It is certainly indisputed, and the observation of the most experienced physicians have placed the matter beyond a doubt, that other organs and parts manifest disease very early in diabetes, and that the assimilative viscera and circulating fluids are very evidently affected. Now, the kidneys, being strictly eliminating organs, or emunctories, removing matters which are hurtful to the system from the blood, how can we conceive that excitement of these organs, the proximate cause of diabetes according to Dr. GOOD and others, can occasion a diseased state of other organs, diminished assimilating function, and especially a morbid condition of the blood itself, the morbidity of which it is the chief office of these organs to prevent, or to remove if in any way produced? Dr. WOLLASTON attributes diabetes to a change in the animal electricity of the kidneys; and M. DUPUYTREN, to their perverted, equally with their increased action. But the remarks now offered are also applicable to these opinions; for the cause of these morbid states must be sought after either in the kidneys themselves, or in some other quarter. If the kidneys be primarily affected, how can the early disorder of other viscera be explained?

18. 2d. The disease has been imputed to a morbid action of the stomach, or some of the assistant chylopoietic viscera. This opinion has derived support from the feeling of heat, pain, and sinking, which is so generally and so early complained of in this disease; as well as from the morbidly increased action of these viscera, particularly of the stomach. Dr. MEAD ascribed it to the liver, from observing the disease most frequently in those who were addicted to the intemperate use of spirituous and fermented liquors. Dr. ROLLO confines it chiefly to the stomach; and

states that it proceeds from "an increased action and secretion, with a vitiation of the gastric juice, and probably too active a state of the lacteal absorbents, — while the kidneys and other parts of the system are affected only secondarily." According to this hypothesis, the chyle is imperfectly formed, and exists in the blood either in a saccharine state, or in such a condition as to be readily converted into a saccharine fluid during its circulation, and its passage through the kidneys. That it is not at once converted into a sweetish fluid, and therefore that the morbid secretion is not elaborated in the stomach and other digestive viscera, seem to be proved by the fact, that no saccharine matter has been satisfactorily detected in the blood, although WOLLASTON, MARCET, BOSTOCK, DUPUYTREN, and THENARD, and more recently MM. HENRY, SOUBEIRAN, VAUQUELIN, SEGALAS, and Mr. KANE have endeavoured to ascertain its existence. It may, however, be admitted, that the saccharine matter may exist already formed in the blood, as is sometimes evidently the case in respect of urea, as has been demonstrated by MM. PREVOST and DUMAS, and be so rapidly eliminated by the action of the kidneys, as never to accumulate it so as to admit of detection by analysis; or it may be granted, that the first part of the morbid process commences in the digestive viscera, and that it is afterwards fully perfected in the kidneys. But these are merely probable suppositions, which scarcely admit of proof.

19. 3d. It has been supposed that a saccharine and imperfectly elaborated chyle, instead of being conveyed into the blood, is carried to the kidneys and urinary bladder, by a retrograde action of the absorbents. This hypothesis was first proposed by Dr. C. DARWIN, who conceived, that when a greater quantity of inebriating fluid than usual is drunk, at the same time that the lacteals are quickened in their power of absorbing it, the urinary branches of the absorbents, which are connected with the lacteals by many anastomoses, have their action inverted, and a large quantity of pale, unanimalised urine is hereby discharged. Where the ingurgitation of fermented or other exciting liquors is continued, or occurs often, the urinary absorbents at length gain a habit of inverted action whenever the lacteals are stimulated; and a whole or great part of the chyle is then carried to the bladder without entering the circulation, and the body becomes emaciated; and the urine is necessarily sweet, and the colour of whey. Numerous objections may be offered to this hypothesis. It is altogether founded on postulata; and, moreover, it proceeds on the gratuitous idea, that the chyle is generally a saccharine fluid, nearly, if not altogether, resembling the diabetic discharge. Now, such is not the case; for chyle contains but little saccharine matter. Besides, the structure of the lymphatics, and their connection with the vascular system, is completely opposed to their retrograde action. P. FRANK has very materially moulded this hypothesis, and into a more plausible form, by relinquishing the untenable idea of a retrograde action of the absorbents. He conceives that diabetes is a disease of the lymphatic system, conjoined with excitement of the urinary organs; that it proceeds from stimulation of both these by some virus formed within, or introduced from



without, and producing a reverse effect to that occasioned by the virus of the rabies canina; so that, while the latter produces a dread of liquids, the former excites a constant desire for them. In support of this doctrine, he adduces the opinion of the ancients, that diabetes is occasioned by the virus of a serpent called *dipsas*, and hence the common name generally given by them to this malady. That it may be excited by the bite of reptiles, or even higher animals, is not impossible. Dr. LATHAM mentions a case produced by the bite of a rat; and it not infrequently arises, as remarked by CHESELDEN and LATHAM, from carbuncles, or chronic abscesses, where it may be presumed that a partial absorption of morbid matter takes place. FRANK supposes that the morbid matter occasioning the disease acts by inducing a morbid irritability of the lymphatic system, owing to which every other part of the frame is exhausted of its nutrition; that the fluids, thus morbidly absorbed, are rapidly conveyed into the circulation, particularly the chyle to the kidneys, which concur in the morbid action; that the cutaneous and other exhalations are hence completely arrested; and that the flux of saccharine urine is thus produced. This is certainly a more plausible doctrine than that on which it is evidently founded; but, even conceding the morbid excitement of the lymphatic system and of the kidneys, the origin of this excitement in a morbid virus or matter is much more gratuitous, and the cause of the saccharine properties of the urine is wholly unexplained.

20. 4th. Dr. CLARKE, and more recently Dr. MARSH, impute the disease, in a more especial manner than has been done by other pathologists, to the cutaneous surface, which, indeed, may be viewed as an important organ of the animal economy; and they consider it “as a sweat driven in upon the kidneys, where this morbid determination keeps up a profuse discharge.” This opinion seems to have been partially entertained by RITTER, STOELLER, and RICHTER, who, whilst they ascribed diabetes, as we have seen, in part to a morbid state of the kidneys, conceived that a depraved function of the skin was also concerned in its production. There can be no doubt that suppression of the cutaneous functions is an early change, and that it contributes to the perpetuation and aggravation of the malady.

21. 5th. One of the most plausible theories which have been advanced, is that which refers diabetes to a dyscrasy or morbid condition of the blood, arising from a diseased state of the assimilating powers of the frame. This doctrine is not materially different from that which was proposed by WILLIS and SYDENHAM, and more recently by PLACE, DESAULT, and LATHAM; and, as well as being more accordant with the procession of morbid phenomena, has a more obvious relation to the exciting causes, terminations, and morbid appearances in fatal cases, than any of the theories now reviewed. According to this doctrine, diabetes is not to be imputed to the derangement of a single organ or system of vessels merely, but rather to defective energy of the whole frame, particularly impeding the advanced stages of the processes of digestion and assimilation. That the blood is not in a healthy state, and the chyle imperfectly assimilated to it,

as well as the crisis of the whole circulating mass deficient, is sufficiently manifested in the appearances which the blood presents when taken from the patient during life, and when observed in the vessels after death. Upon examining specimens of the blood taken from diabetic patients, MM. HENRY and SOUBEIRAN found the quantity of its fibrine and albumen one fourth less than is assigned to healthy blood by BERZELIUS and DARCET; and BACHETONI remarked that oil of almonds passed off with the urine, unchanged in its passage through the digestive and assimilating organs. The state of the blood, also, in the veins and cavities of the heart, is somewhat peculiar—generally being semi-fluid, sometimes resembling treacle, and very dark-coloured. That this state is not primary, but is a consequence of deficient vital energy of the organic nerves, and of the assimilating organs, in connection with impeded exhalation and secretion from all surfaces and organs excepting the kidneys, seems most probable. HUFELAND supposes, that, owing to the changed action of the kidneys, and the unassimilated state of the chyle with the blood, the former of these fluids, with the nutritious parts of the latter, containing the saccharine principles, are excreted with the urine, and occasion the phenomena of the disease. This opinion, in its general bearing, comes as near the truth, perhaps, as any that has been offered; but still it admits of reference to antecedent disorder.

22. 6th. I should, therefore, conclude, from what I have seen of, and thought respecting, this malady, that, owing to deficient or exhausted influence of the nerves supplying the assimilating viscera and vascular system, the chyle is not readily or perfectly changed into blood, nor are the nutritious parts of the blood attracted by, and identified with, the various structures; that this imperfect performance of the assimilating functions must necessarily be attended by deficiency of all the secretions and excretions excepting the urinary, particularly the cutaneous, the pulmonary, the intestinal, and the hepatic, as both classes of functions are under the influence of the organic system of nerves. Thus a redundancy of imperfectly elaborated blood must be the result, a portion of which will be carried off by the kidneys, as in ordinary circumstances; for as long as these emunctories retain their powers, they are the appropriated safety-valves of the vascular system, by eliminating both the watery, the saline, and other elements of the blood, when they become excessive. These states and changes account for the simple excess of urine; the more watery parts of the blood being carried off by the kidneys, instead of being secreted from the cutaneous, the respiratory, and intestinal surfaces; and the action of the kidneys, being once excited in the manner now stated, becomes excessive, from the superabundance of the imperfectly elaborated and stimulating matters contained in the blood circulating through them. The saccharine matter in the urine evidently arises from the morbid condition of the blood originating in the manner now explained; the unassimilated elements readily assuming the mellitic combination, probably in consequence of the state of vital action exerted by the kidneys during their excretion. What the precise nature of this action may be, cannot be easily ascertained; but it probably is,



as DUPUYTREN and others have supposed, a perverted as well as an excited action: the morbid condition of the organic nervous influence, and of the blood, changing the vital functions of the kidneys, in addition to simply exciting them. That a morbid state of organic nervous influence throughout the tissues, and of the blood, exists in this disease, is shown by its principal phenomena, and by the fact that diffusive inflammation followed bleeding in two instances recorded by Dr. DUNCAN.

23. IV. TREATMENT.—The means of cure employed in this disease have been varied exceedingly, according to the opinions entertained respecting its nature. Many remedies have also been resorted to empirically, without reference either to their mode of operation, or to the presumed pathology of the malady. As it will be useful to the practitioner, I will first exhibit a succinct view of the different modes of treatment which have been recommended, venturing such remarks as my experience enables me to suggest; and afterwards I shall proceed to state the plan which has seemed most successful in my practice.

24. i. *View of the Treatment proposed by Authors.*—In estimating the degree of success which writers state they have derived from various remedies, it should be kept in recollection that other morbid states of the urine, besides that which is characterised by the presence of saccharine matter, particularly those consisting of excess of albumen and urea in, conjoined with augmented discharge of, the urine, have been considered as constituting a variety of diabetes, — the *diabetes insipidus*; and that, owing to this circumstance, many of the methods of treatment which have been stated to have cured diabetes, have been successful only so far as respects a less difficult and dangerous form of disease, and one which is frequently no closer related to true diabetes than as respects the increased quantity of the urinary secretion.

25. A. *Astringents* have been recommended by many writers, and various remedies belonging to this class have received approbation. The greater number of the mineral, and some of the vegetable acids have been used, either alone or in combination with other medicines.—*a.* GILBY, EARNEST, SCOTT, and BRERA have employed *nitric acid*, sometimes with much benefit. BRERA recommends the internal use of this acid to be conjoined with mercurial inunction. I have given it combined with *opium*, the patient at the same time using the warm bath and animal diet. Some advantage was derived from this treatment for a considerable time; but the disease returned. I have likewise conjoined the *nitric* with the *muriatic acid*, in equal quantities, and employed it internally combined with *opium*, and externally in the form of the *nitro-muriatic lotion* applied warm over the epigastrium and loins. This has certainly appeared a very beneficial treatment; but as it was not confided to alone, but conjoined with other means which I shall adduce in the sequel, it is difficult to determine the degree of benefit derived from it.

26. *β.* The *phosphoric acid*, both alone, and in combination with, or neutralised by, other substances, has been recommended by NICOLAS, GUEUDEVILLE, LATHAM, SHARKEY, and VENA-

bles. Dr. SHARKEY speaks favourably of the *phosphate of soda*. It has the advantage of preserving a free state of the bowels, whilst it tends, in a very marked manner, to diminish the flow of urine: but I believe that more advantage will be derived from it, as well as from the *phosphate of iron*, which has been strenuously recommended by Dr. VENABLES, in the excessive discharge of albuminous urine,—an affection frequently observed in young subjects,—than in the disease under consideration.

27. *γ.* The *sulphuric acid and its salts* have received the sanction of numerous writers, who have generally prescribed them in combination with preparations of *cinchona*, *aromatics*, *opium*, &c. I have exhibited the acid with the *sulphate of zinc*, and with the *sulphate of quinine*, as one part of the treatment adopted in the cases which have occurred to me; and, as from a large proportion of the means employed, benefit was derived from it for some time. The *sulphate of alumina* has been prescribed in a variety of forms, but most frequently dissolved in whey, by DOVER, BROCKLESBY, HERZ, LINDT, and many others. But its want of efficacy has been satisfactorily shown by BRISBANE, OOSTERDYK, and FRANK; the last of whom carried the use of it to a large extent, in order to test its effects. Dr. WINTRINGHAM applied the *sulphate of alumina*, dissolved in vinegar, as an epithem on the loins. The *sulphate of iron* and the *super-sulphate of potash* have likewise been employed in this disease. The latter of these possesses the advantage of acting as a deobstruent aperient, and is hence often of much service. Dr. FRASER entertains a favourable opinion of the former.

28. *δ.* Several other astringents, as *sumach*, *kino*, *catechu*, in the form both of tincture and decoction, *lime-water*, &c., have been recommended; but they seem to have been of no further service than auxiliaries to other means. The *aqua calcis*, used as common drink, either alone or with milk, has been praised by WILLIS, SCHUTZ, JARROLD, FOTHERGILL, WATT, and FRANK. Although astringents have been very generally employed, some doubts have been thrown upon their utility by AMATUS LUSITANUS, and others. SYDENHAM, however, expresses himself favourably respecting them when conjoined with aromatics and opiates,—a mode of exhibiting them which is certainly the most preferable, and the only way in which I have employed those now enumerated (§ 42.) in this disease.

29. B. *Tonic astringents* have received much attention, particularly from STOELLER, FERRIAR, MORTON, FAHNER, FRANK, and others. Amongst those, *cinchona*, in decoction with the *elixir of vitriol* or with *simarouba*, or in powder with the *uva ursi*, in doses of a scruple or half a drachm of each, with half a grain or a grain of *opium*, and repeated every four or five hours; and the *preparations of iron*, either alone or with *cinchona* or *cascarilla*, deserve a particular notice. Tonics with *catechu*, *kino*, &c., and the vegetable bitters, as well as the mineral tonics, in conjunction with *opium*, have severally been employed, particularly by SHEE, ABRAHAMSON, ROEBER, &c. Under this head, I may notice the use of astringent wine, as having been recommended by CELSUS, and, in modern times, by WILLIS and MORTON.

30. C. *Diaphoretics* have been very generally



recommended, and particularly by ROEBER, STOELLER, WERNER, M'CORMICK, and MARSH, with the view of restoring the suppressed functions of the skin, and diminishing the determination towards the kidneys. Amongst the various medicines which have been exhibited with this intention, the *pulvis ipecacuanhæ comp.* and *opium with antimonials* deserve a particular notice. I have prescribed these with full doses of *camphor* on several occasions with much benefit. This last named substance has been much praised by SHEE and RICHTER, who recommended it to be exhibited in large doses in mucilaginous emulsions. Of this class of remedies, there is certainly none more decidedly useful than the *warm and vapour baths*. SALZBURGER, RITTER, WERNER, RICHTER, HEINEKEN, and MARSH justly place much reliance on them. To these may, perhaps, be added the *sulphur baths*; but I have had no experience of them. The promotion of a free and even copious *perspiration* by the constant use of woollen clothing next the skin, and active exercise, has been noticed by several writers; and, I am enabled to add, forms a most important part of the regimen to which diabetic patients should be subjected.

31. *D. Alvine evacuations.*—*a. Emetics* have been employed with advantage in some cases by ETTMULLER, RIVERIUS, BRENDÉL, MICHAËLIS, ROLLO, WINTRINGHAM, WATT, and RICHTER, particularly early in the disease. It is chiefly at this period, or in subjects whose constitutions still retain some degree of vigour, that they are admissible. *b. Purgatives* have received less attention from writers on diabetes than they deserve. TRNKA, however, has passed very just encomiums on them: and they have likewise received some notice from Dr. MARSH and a few other recent authors. I believe them to be very generally beneficial, not only in as far as their occasional exhibition may remove morbid accumulations, and obviate constipation, which is so frequently an attendant on the disease, but also as regards a continued and decided use of them, so as daily to procure two or three copious evacuations. With this view, full doses of *rhubarb*, or of the *infusion of senna*, with compound infusion of *gentian*, or of the *phosphas sodæ*, should be exhibited daily. There are few remedies that deserve a more favourable notice in diabetes than *rhubarb*. It received the warm approbation of BAGLIVI and LISTER, who recommended it in conjunction with *aromatics*, and of BROCKLESBY, MORTON, BUCHWALD, and HARRIS. Dr. BAILLIE prescribed it with *laudanum*. I have employed it frequently as an aperient, both in powder and infusion; and combined it with vegetable tonics, *aromatics*, and *opium*, with the intention of promoting the digestive and assimilating powers. It is one of the best medicines that can be used in this disease.

23. *E.*—*a. Sulphur* and the *alkaline sulphurets* have received a deservedly favourable notice from AUTENREITH, REDFEARN, BANG, ROLLO, and MICHAËLIS. The *hepatised ammonia* was particularly noticed by Dr. ROLLO, with the view of furnishing to the system, along with a liberal animal diet, the elements which seemed to be wanting to the chyle and to the urinary secretion. The free use of *sulphur*, so as to produce an aperient effect, is often beneficial. I

have seen much advantage derived from it; and I conceive that the sulphurets are often serviceable as adjuvants to the general plan of treatment. Dr. CHRISTIE mentions them with approbation in his interesting details of cases treated by him in Ceylon. *b. Cantharides*, either in the form of powder or tincture, exhibited alone or combined with *camphor*, have received a favourable notice from MORGAN, WERNER, HERZ, STOELLER, &c. WOLFF combined them with *cinchona*: but BRISBANE, BUSCH, and FRANK derived no advantage from them.

33. *F. Opium*, either in substance or tincture, alone, or combined with tonics and aromatics, or with astringents or with diaphoretics, with *camphor*, *valerian*, or with *assafœtida*, or even with the *sulphurets*, according to the varying features of particular cases, is, perhaps, the most generally applicable and beneficial remedy that has been employed. But it should be given in large doses, and its use persisted in, and so managed as not to prevent a free and continued action on the bowels. If the dose be sufficiently large, it will seldom constipate the bowels in this disease, or impede the action of purgatives and aperients; and it will determine more sensibly to the skin, while it will more decidedly diminish the urinary flux than when prescribed in small doses. It is chiefly to ARCHIGENES, SYDENHAM, BUCKWALD, and WARREN, and afterwards to GUEUDEVILLE, HEINEKEN, MONEY, MARSH, CARTER, and others, that we are indebted for proofs of the great advantage to be derived from this medicine in diabetes.

34. *G. a. Mercurial inunction* has been recommended by SCOTT, LUBBOCK, and others. BRERA prescribed it at the same time with the internal use of nitric acid; and FRANK, with tonics: he even advised it to be carried so far as to produce salivation. When diabetes is complicated with hepatic disease, this treatment will be requisite. I have seen it employed with some advantage, alternated with the *nitro-muriatic* lotion applied on the hyponchondria and loins, in a case of this description. When biliary derangement exists, the occasional exhibition of a full dose of calomel with *rhubarb*, or the compound extract of *colocynth* at bed-time, and followed, in the morning, by an active purgative medicine, will be found of service.—*b. Medicines* that act as *diuretics* may be supposed to be contra-indicated in diabetes. But they are not necessarily injurious; for, if they have a beneficial effect on the body generally, or on the visceral disorders with which diabetes is associated, they may even be of benefit; and if the action of such medicines on the kidneys be energetic, they may change the morbid action induced in these organs by the disordered state of organic nervous influence and of the circulating fluid, and in this way prove beneficial. Among the different substances that have a diuretic effect, *colchicum* may be mentioned as having lately been sometimes prescribed in this disease, but chiefly on account of its sedative operation. It may be of some service in promoting the biliary secretion, in increasing the quantity of urea and uric acid in the urine, and in diminishing the irritability of the frame. Its good effects, however, require confirmation, and may probably be ensured by combining it with ammonia or its preparations, or with camphor.

35. *H. Nutrients* in various forms have been



strenuously recommended by HOME, ROLLO, DUPUYTREN, NICOLAS, OSWALD, FRANK, CHRISTIE, and many others. Dr. ROLLO particularly insisted upon the nearly exclusive use of animal food, with the view of resisting the secretion of saccharine matter, and furnishing the elements of urea and the animal salts to the blood. There can be no doubt that the greatest benefit has been derived from this treatment. It should, however, be admitted, that it often fails; and that, when it is too freely indulged in, it sometimes occasions a diarrhoea, which exhausts or even carries off the patient. With a knowledge of these occasional effects, Dr. PROUT recommends it with very judicious restrictions, and to be taken with a moderate proportion of farinaceous food; and FRANK advises, in addition to it, the decoction of Iceland moss, or of the *althæa officinalis* with milk.

36. *I.* Besides the foregoing, various other remedies have been prescribed. The *cuprum ammoniatum* (in doses of half a grain to a grain twice or thrice a day), *myrrh*, and *valerian*, have received the commendations of FRANK and RICHTER. *Assafœtida* has been favourably noticed by WOLFF; and *tartaremetic* combined with *valerian* has been directed by RICHTER. A combination of *assafœtida* with *myrrh* and *valerian* has also been very generally used by Continental physicians. Dr. WATT has employed the *volatile alkali*; and it will certainly often prove an useful adjuvant, combined with other medicines, particularly with opium, or with tonics or diaphoretics; and be serviceable in combating such nervous or sinking symptoms, as sometimes occur in the course of the disease. It may, moreover, counteract the tendency to the formation of saccharine matter, and promote the animalisation and assimilation of the chyle, as well as the formation of urea. Even *urea* itself has been recently tried as a remedy in this disease by SEGALAS, but instead of changing the mellitic urine, it was found to increase its quantity. HUFELAND, and some other physicians in Germany, have prescribed recent *ox-gall* in as large doses as the stomach will bear, and frequently with the effect of causing the disappearance of the saccharine state of the urine during its use; the disease, however, has generally returned upon discontinuing the medicine.

37. *K. Blood-letting* in diabetes had been mentioned as far back as the Commentaries of ARCHIGENES ON AETIUS; and it was noticed as an occasional measure by LE FEVRE and ROLLO. But it is to Dr. WATT that we are indebted for the introduction of this practice in a most decided form. This physician advises full and often-repeated blood-lettings, with the view of arresting the inflammatory determination to the kidneys. This plan has been adopted by Dr. SATTERLY and others with manifest advantage, whilst it has failed with some. Drs. PROUT and HUFELAND consider it beneficial only in the early and acute stage of the disease. Dr. MARSH offers a similar opinion. And my own experience would lead me to employ it, only when the disease is recent, the strength of the patient not much exhausted, and the pulse remains of good strength and volume. When the patient feels much pain in the loins, an additional indication is thereby furnished for resorting to it. Sir DAVID BARRY

has advised frequent cupping on the loins in the course of the disease,—a practice which is deserving of adoption in cases of the above description, or when much pain is complained of in that situation. I have found advantage from the application of a number of leeches on the epigastrium, and cupping on the hypochondria, both in relieving the sense of pain and heat complained of in the stomach, and in lessening the quantity of the urine, and of the saccharine matter contained in it. Depletion, as Dr. WATT first observed, certainly improves the state of the blood, and renders the weak and imperfect crassamentum more firm.

38. *L. Blisters and external applications* of a derivative and irritating nature have been recommended by RITTER, DESAULT, VAN SWIETEN, WHYT, and REIDLIN, to be applied chiefly to the loins and epigastrium. FRANK and WEIZ advise repeated blistering of the sacrum. *Setons*, *issues*, and *moxas* have likewise been employed in the latter situation; but I believe without any permanent benefit. The most efficacious modes of derivation are the vapour bath, warm alkaline baths, and thick woollen clothing worn next the skin. *Topical applications* of a tonic and an astringent nature have also been directed to be kept constantly applied to the loins by WHYT, REIDLIN, and VAN SWIETEN. Of these, however, I have had no experience. I have, however, prescribed liniments to this situation, as well as to the epigastrium, generally composed as follows:—

No. 165. *R.* Liniment. Camphoræ, Olei Terebinth., Linimen. Saponis Comp., aa 3j.; Pulv. Opii Puri 3j.; Pulv. Capsici Annui 3 ss.; Olei Limonis M xxx. *M.* Fiat Linimentum, cum quo assidue illinantur regio lumbalis et spina dorsi mane nocteque.

I have found this application extremely useful in the excessive discharge of albuminous urine, which is not infrequently met with in young subjects. I have likewise employed it with other means in the mellitic state of urine; but it was difficult to determine what share of the temporary benefit derived was owing to it.

39. *ii. The Treatment in which the Author is most disposed to confide.*—It is not easy to form to ourselves precise and rational indications of cure in this disease, particularly as opinions respecting its nature are not supported by a sufficient number of accurately recorded facts; nor are those which have been observed so constantly present, or so uniformly grouped, as to permit us to draw indisputable pathological inferences, for the basis of therapeutical indications. I shall therefore state succinctly the method of cure, which is sanctioned by my own observation, and by experienced physicians. The remark which has been made by Dr. PARR, Dr. PROUT, and others, that this disease should be viewed in a two-fold light—namely, 1st, as respects its saccharine state independently of the increase of its quantity; and, 2d, as regards this state in connection with an augmented secretion—should be kept constantly in recollection; and, although the discharge of an increased quantity of urine, in addition to its saccharine condition, generally indicates either a more advanced or a more severe state of disease, yet we should be aware that the saccharine change is the more important of the two; and that it is much more easy to diminish the quantity than to improve the quality of this



secretion. Dr. PROUT justly remarks, that it is exceedingly doubtful if there be any remedy that exerts a specific action in improving the quality of the urine—at least, there is none at present known. The improvement can therefore be attempted only by those agents that have a tendency—1st, to restore the general health and assimilative energies of the frame; and, 2d, to diminish the quantity of the secretion.

40. These ends are generally all that we can reach; and, by attaining them, we sometimes advance still further, and thereby improve the quality also of the discharge. There are, however, other subordinate objects, which, although they might be accomplished with the fulfilment of the chief ends now proposed, yet often require an immediate regard; and the more especially as their attainment very frequently promotes the chief intentions of treatment. These are—*a*. To remove a congested, loaded, or oppressed state of the vascular system, and reduce the quantity of the circulating fluid more nearly to a level with the amount of vital power and assimilative function. *b*. To promote and improve the secretions employed in digestion, and excite the exhalations and secretions from the respiratory and intestinal surfaces. *c*. To remove the unperceptible and harsh state of the cutaneous surface, to increase perspiration; and thereby to lessen the determination to the kidneys. *d*. To diminish the morbid sensibility and irritability of the frame, with the other morbid phenomena allied to them. The means which we employ in attaining both the principal and the subordinate objects which I have now stated, will, of course, vary exceedingly, according to the particular features of individual cases, and the constitutional powers of the patient. The previous duration of the disease—the degree of activity it may present—the age of the patient—the state of the circulation—and the particular condition of the urine, as respects both its density and quantity, should individually and collectively be considered by the practitioner as circumstances calculated greatly to modify the means of cure; and should weigh so entirely with the judicious, as to lead them to consider even the best practical suggestions which can be offered as applicable merely to some cases, and as requiring to be varied, and rendered appropriate to others. It must be obvious that we cannot endeavour to attain, *seriatim*, the ends now proposed; for a judicious and an active treatment will often fulfil two or more of them contemporaneously.

41. I have already noticed the opinions of Dr. WART and others (§ 37.) as to blood-letting. In cases of recent occurrence, with an active state of the circulation, and pain in the loins, with much heat and pain in the epigastrium, or where congestion or oppression of the vascular system exists (§ 40. *a*), I consider general blood-letting, repeated as often as the circumstances may require, as requisite to fulfil the intention stated above (§ 40. *a*). The frequency of, or even the propriety of repeating, the operation will depend much upon the appearances of the blood drawn, and the effects produced by it. If the crisis of the blood be weak—the coagulum being loose, and dark—I have seen no benefit derived from it until the vital energies have been somewhat excited by appro-

priate means. If, however, doubts respecting the propriety of its repetition be entertained, cupping upon the loins, or upon the hypochondria, or the application of leeches on the epigastrium, according as the sensations of the patient may direct the practice, should be substituted, and carried to an extent, as respects quantity and frequency of repetition, on which the observation of the practitioner will enable him to decide. In protracted cases, when the disease occurs in old subjects, when the debility is great, and the pulse quick, small, or weak, general blood-letting is not productive of benefit. If, even in these cases, much pain, tenderness, or fulness be complained of about the epigastrium, local depletion, as now recommended, may be employed in its vicinity. It will often happen that blood-letting—especially general blood-letting—will, at first, either be inadmissible, or of little or no service; and yet it will subsequently prove of very great benefit, after the other parts of the treatment have prepared the system for it. This fact should not be overlooked at any period of the disease, even in the most unpromising cases.

42. Immediately after depletion, a complete evacuation of the bowels, either by a dose of castor oil, or by the following pill, repeated according to circumstances, will generally be directed with advantage:—

No. 166. R. Extr. Colocynth. Co. 3ss.; Pulv. Ipecacuanhæ gr. iij.; Saponis Castil. gr. viij.; Olei Crotonis Tiglii ℥ij. M. Fiat Pilulæ xij. Capiat binas statim, et repetantur binæ quartâ quâque horâ donec plenè dejecerit alvus.

The bowels being freely evacuated by the above means, assisted in more obstinate cases by enemata, of which I believe those with from one to two ounces of turpentine to be the most efficacious, a full dose of opium should be exhibited, or of the pulvis ipecacuanhæ compositus, or the following:—

No. 167. R. Camphoræ rasæ gr. v.; Pulv. Ipecacuanhæ gr. j.; Pulv. Opii gr. ij.; Pulv. Myrrhæ gr. vj.; Mucilag. Acaciæ, vel Conserv. Rosar., q. s. ut fiat Bolus, statim sumendus.

After having taken this, the patient may have recourse either to a warm or to a vapour bath, have the surface always well rubbed with the flesh-brush on leaving it, and clothe himself in a warm dress with flannel next the whole of the skin. The opium, or the Dover's powder, or the bolus above directed, and the warm bath, may be repeated at intervals varying according to the circumstances of the case. The effect of this treatment is manifested in the state of the skin, and urine, as well as in the feelings of the patient. But, in cases characterised by much debility and irritability, we must vary the means. Here the sulphate or ammonio-tartrate of iron, or the sulphate of zinc, or the sulphate of quinine, combined with opium and capsicum or camphor, and exhibited either in the form of pill or of draught, will often prove of advantage.

No. 168. R. Infus. Rosar. Co. 3jss.; Quininæ Sulphatis gr. ij.; Zinci Sulphatis gr. ss. ad j.; Acidi Sulph. Arom. ℥xx.; Tinct. Opii ℥xx.—xxx.; Tinc. Aurantii Co. 3j.; Tinct. Capsici ℥xx. M. Fiat Haustus, ter quaterve in die capiendus.

In cases of the same description, Dr. PROUT recommends an electuary with the *carbonas ferri*, and *opium*, and *albumen ovi*. I have given the carbonate of iron in the form of electuary, with confection of senna, &c. (see F. 79. 86. 93.),



in order to preserve a freely open state of the bowels. The combination of tonics and astringents, or even of astringents with aperients, is sometimes useful. I have obtained advantage from the following:—

No. 169. *R. Pulv. Cinchonæ, Pulv. Rhei, aa 3 ss.; Magnes. Carbon. ʒ j.; Aquæ Cinnamom. 3 jss.; Confect. Arom. gr. x. M. Fiat Haustus, bis in die sumendus. Vel,*  
No. 170. *R. Pulv. Rhei, Pulv. Uvæ Ursi, aa 3 jss.; Aquæ Cinnamom. 3 jss.; Confect. Aromat. gr. xij. M. Fiat Haustus, bis terve quotidie sumendus.*

The above may also be taken with a full dose of laudanum, when the bowels have been sufficiently acted upon, and the irritability of the system is considerable. In order to counteract this symptom, I have on some occasions had recourse to the *hydrocyanic acid* in doses of from one to three minims, in a mucilaginous mixture, or employed it in combination with iron or with zinc, in the state of a *prussiate of iron* and *prussiate of zinc*. The following was lately prescribed, and continued for several days, with advantage:—

No. 171. *R. Camphoræ rasæ et subactæ gr. xv.; Oxydi Zinci 3 ss.; tere cum Mucilag. Acaciæ vel Tragacanth. 3 ss.; Aquæ Cinnamom. 3 ivss.; Acidi Hydrocyanici ʒ xv. Misce. Fiat Mist., cujus capiat cochlear. j. vel ij. larga, ter quotidie, prius agitata phialâ.*

43. Whilst tonics or astringents are employed, either of the kind now noticed, or of any other description, the bowels ought to be kept open, not less than two or three satisfactory evacuations being daily procured; and this action should be maintained perseveringly for a long time, either by purgatives given in the intervals between the exhibition of the tonics; or, what is preferable, in conjunction with them as in Form. 266., or as follows:—

No. 172. *R. Infus. Gentianæ Comp. 3 j.; Infus. Sennæ Comp. 3 ss.; Tinct. Rhei 3 ij.; Spirit. Ammon. Arom. 3 ss. M. Fiat Haustus, bis terve quotidie sumendus.*

No. 173. *R. Decocti Cinchonæ, Infus. Rhei, aa 3 vj.; Tinct. Cinnamom. 3 jss.; Ammoniac Carbon. gr. vj. M. Fiat Haustus, bis terve quotidie sumendus.*

As the difficulty of preserving an open state of the bowels is great in this disease, the quantity of purgative ingredients in the above medicines may be increased, or others added, according to circumstances. Care should always be taken never to employ for this purpose saline medicines, excepting the phosphates in large doses, which are sometimes of service. Even calomel should be avoided, unless conjoined with opium, or when we find it requisite to act decidedly on the biliary secretions, and then a single full dose of it may be given. If the biliary organs require the use of deobstruent remedies, the *hydrargyrum cum creta* is the most suitable preparation in this disease; or the internal or external use of the nitro-muriatic acids (§ 34.), or mercurial inunction. I have seen benefit derived from *iodine*, and *nux vomica*, or strychnine, in several cases of diuresis, but I have had no experience of them in diabetes.

44. In addition to the foregoing, and contemporaneously with the use of purgatives, diaphoretics, opiates, &c., external irritation, and derivation may be resorted to. For this purpose repeated vesication on the loins or epigastrium, or the excitement of artificial eruptions on these parts by croton oil rubbed upon them, seem to be the preferable means. But, to be productive of any service, the external irritation should be kept up for a very considerable time, or frequently repeated. If the above measures fail, we must have recourse to such of the other medi-

cines as have been noticed (§ 24—38.), as may seem most appropriate to the person under treatment; and we should not be content with trying the various remedies in succession; but so associate, and contemporaneously prescribe them, as to bring their combined action to bear upon the morbid conditions which seem to exist in particular cases.

45. Whilst these means are being employed, the *diet and regimen* of the patient should be regulated, and consist chiefly of animal food, with a small proportion of farinaceous substances. He should abstain from vegetables, particularly those which are sweet and acescent, and from fruits. Animal and farinaceous food are much more easily digested and assimilated than the more bulky vegetables; and, partly on this account, are more suitable to the patient. For, although the demand for food is urgent, owing to the call made upon the digestive organs to supply the waste arising from the nature of the discharge, and to the erethismal state of their mucous surface, yet the digestive and assimilative energies of the frame are defective, and insufficient for those articles which require much change to be effected in them during the process. Beside, animal food furnishes fewer of the constituents of saccharine matter. Much attention should also be paid to the quantity as well as the quality of both the solid and fluid ingesta. Dr. PROUT has very judiciously remarked, that the constant and pressing desire for food generally induces the patient to take by far too much at one time, the consequences of which are not only unfavourable to his recovery, but sometimes dangerous and even fatal: and he refers the greater number of sudden deaths, which is not an infrequent termination of this disease, to errors either in the quality or quantity of the food, or to both, the patient having been frequently cut off after what is commonly called a hearty meal. The diet, therefore, as to its quantity and description, should be strictly regulated by the physician, be chiefly of a solid form, and not taken at longer intervals than four or five, nor at shorter than three, hours. The patient ought also to abstain, to the utmost of his power, from all drink for an hour or two after his meal. Animal food ought not to be taken oftener than twice in the day; and beef-steaks or mutton chops, under-done and plainly cooked, are perhaps the preferable kind. The other meals may consist of any of the farinaceous articles with milk, or occasionally of eggs.

46. The drink also should receive particular attention. Dr. PROUT expresses himself favourable to the use of distilled water. Of this, however, I have had no experience. Lime water, either alone or with milk, alum whey, and the Bristol Hotwell and Bath waters, have been long celebrated in this disease, and are certainly amongst the most quenching drinks that can be employed in it. I have prescribed the mineral acids, and particularly the nitric and muriatic acids, with seeming advantage. In a case which lately occurred to me, I employed a weak solution of the boracic acid, and afterwards of the sub-borate of soda, with much benefit. In order that the patient may not be induced to drink too largely, the beverages prescribed should be taken in a tepid state, and his resolution be fortified against the seduction of his appetites. In ad-



dition to this diet and regimen, he should remove to a dry and warm situation, should constantly wear woollen next his skin, and keep up a free cutaneous discharge by suitable exercise. Even when he is convalescent, or apparently recovered, this regimen ought not to be abandoned; and the bowels should be constantly kept open by the tonic aperients already recommended, or by an electuary composed of sulphur, magnesia, and confection of senna. Sulphur, in full and frequent doses, is one of the best remedies we can resort to either in the disease or during recovery, as it acts both on the bowels and skin. Errors in diet, or in the use of beverages, and even a single irregularity as to fruit and vegetables, will hazard a return of the disease.

47. iii. *Treatment in the dark-skinned varieties of the species.*—I have had occasion to see two cases of this disease in negroes; and Dr. CHRISTIE has given the particulars of ten or twelve cases which he treated among the natives of Ceylon. In all his cases, as well as in mine, the disease was evidently owing to a very poor vegetable diet, and a moist state of the air. Dr. C.'s cases terminated favourably from the use of animal food, the sulphuret of potass, lime-water, and purgatives. The cases which occurred to me were treated with tonics, purgatives, the warm bath, and diaphoretics and narcotics: they derived some benefit, but circumstances occurred which prevented me from knowing the ultimate results.

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DIAGNOSIS. See SYMPTOMATOLOGY.

DIAPHRAGM (from διαφράσσω, I separate).—

SYN. Τρόζωμα, Aristotle. Διάφραγμα, Φρένες. Septum transversum, Lat. Der Zwerghmuskel, Ger. Diaphragme, Fr. Midriff, Eng.

1. When we consider the musculo-tendinous structure, and varied connections of the diaphragm,—that it is situated between three serous membranes, and attached to the vertebral column, the ribs and their cartilages,—that it is traversed by the most remarkable nerves and blood-vessels of the body, and itself provided with important vessels and nerves,—that it is in more or less direct contact with the lungs, the heart, the liver, stomach, pancreas, kidneys, and spleen; and intimately associated by its nerves, its vessels, and its functions, not only with the mucous surface of the respiratory organs, as well as with these organs themselves, but also with the digestive and large secreting viscera,—its importance in a pathological point of view must be apparent. The extent of its organic and functional relations are such, that agents acting on either the external or internal surfaces of the body must necessarily influence its actions. It cannot, therefore, be a matter of surprise to find it frequently subject to disorder; but I am at a loss to conceive the reason for the very general neglect with which even its most serious diseases have been treated. This can be owing only to the circumstance of their being imperfectly understood, or referred to some one of the



adjoining organs, and viewed as merely symptomatic or secondary affections.

1. INFLAMMATION OF THE DIAPHRAGM.—*SYN.* *Diaphragmitis* (Hildenbrand, J. Frank, &c.); *Paraphrenitis*, *Paraphrosynis* (Rufus Ephesius, et Auct. Vet.); *Diaphragmite*, *Paraphrénésie*, Fr.; *Zwergmuskell-Entzündung*, Ger.

*CLASSIF.* III. CLASS, I. ORDER (*Author*).

2. *DEFIN.*—*Acute pain and constriction of the lower part of the thorax, extending to the back and loins, increased upon respiration and raising the body erect, with singultus, convulsive distortion of the angles of the mouth, and very acute inflammatory fever.*

3. i. *SEAT.*—Inflammation of only the musculo-tendinous structure of the diaphragm is a very rare disease, particularly in its primary form; and I believe is very seldom met with, excepting upon the disappearance of rheumatism from some external part, or after penetrating wounds and other external injuries. As a consecutive or secondary affection, and especially in conjunction with inflammation of one or more of its serous membranes, it frequently occurs, although often either entirely overlooked, or mistaken for inflammation of some one of the adjoining viscera. The advantages, of being able to distinguish it in practice are not diminished on this account; and it often becomes of great importance to ascertain its existence, whether as a primary or as a consecutive disease.

4. I believe that inflammation may originate in the cellular tissue connecting the serous membranes reflected over the diaphragm to its musculo-tendinous structure, in which case the disease will extend chiefly to either one or both of those surfaces; but that, in the more frequent states of diaphragmitis,—particularly its consecutive form,—the inflammation commences in one of the serous surfaces, and extends thence, through the medium of the sub-serous cellular tissue, more or less to the other structures of the organ.

5. ii. The *CAUSES* of diaphragmitis, particularly in its consecutive forms, are generally those which are productive of pleurisy, pneumonia, hepatitis, or peritonitis. In addition to those, I may adduce others, which have a more evident influence in producing this disease, viz. punctured and other wounds; external injuries and fractures of the lower ribs; concussions of the trunk, particularly from missing steps on descending stairs, or from falling upon the hips, immoderate laughter; violent retchings; continued crying and weeping; obstinate singultus; currents of cold air, when the body is perspiring; the incautious use of cold drinks, ices, &c.; the suppression of painful emotions; violent efforts of any description; the repression or metastasis of rheumatism; the stoppage of accustomed discharges; and the drying up of old eruptions or ulcers by external applications. Instances of the occurrence of inflammation of the diaphragm from the repression of rheumatism have been recorded by PATERSON (*Mem. of Med. Society of London*, vol. v. No. 32.) and PORTAL (*Anat. Méd.* t. ii. p. 444.); and from healing up old sores, suppressing gout, &c., by AASKOW (*Act. Reg. Soc. Med. Hafn.* t. i. p. 205.), BOISSEAU (*Nosographie Organ.* t. xi. p. 620.), WENDTSELLE, and others. HILDENBRAND considers the

habit of wearing tightly laced corsets a cause of the disease. I doubt not that it is, at least, a predisposing cause.

6. iii. *SYMPTOMS, COMPLICATIONS, &c.*—*A.* Either after rigors, chills, horripilations, &c., or consequent upon disease of some one of the abdominal or thoracic viscera, the patient experiences violent, sharp, burning pain, tension, and cord-like constriction, at the lower part of the thorax, particularly beneath the sternum and hypochondria, and stretching to the loins,—increased and descending lower during inspiration—diminished and ascending during expiration,—augmented by coughing, sneezing, fulness of stomach, and pressure on the abdomen; likewise by vomiting, by the expulsion of the fæces or urine, and by bending the trunk of the body in any direction. The breathing is short, frequent, anxious, small, and performed entirely by the intercostal muscles, the abdomen being nearly motionless. The hypochondria fall inwards, or are retracted, and, with the precordia, are sensible to pressure. There are frequently painful and difficult deglutition, referrible to the lower part of the oesophagus and cardia; great anxiety, with occasional interrupted sighs; singultus, particularly towards the close of the disease; involuntary retraction of the angles of the mouth, or risus sardonicus; delirium, which is sometimes furious; spasms, or great feebleness of the muscles of the abdomen and extremities; irritable, porraceous vomiting; leipothymia or sinking, &c. The pulse is always frequent—at first strong and hard, afterwards small, more quick, wiry, &c. The bowels are constipated and urine in small quantity; thirst is at first urgent, afterwards not felt; and restlessness, particularly as the disease advances, is extreme.

7. *B. Complicated Forms.*—*a.* The symptoms vary considerably with the surface of the organ chiefly affected, and according as inflammation of an adjoining viscus may have preceded, accompanied, or followed that of the diaphragm. When inflammation implicates the diaphragmatic pleura, or extends to the lungs, mediastinum, or pericardium, we must expect to observe many of the symptoms of those diseases; particularly those consisting of lesion of the function of respiration. Percussion will give out a somewhat duller sound than natural; cough will be more or less complained of, and be frequently attended with a watery mucous expectoration.

8. When the inferior surface of the diaphragm is inflamed, the stomach and liver seldom escape participation in the disease. In this case the pain and sensibility of the hypochondria are increased, and the stomach is more severely disordered. When the muscular or tendinous structures are chiefly implicated, the complaint assumes its most violent forms; and, owing to the nerves of the organ being then more seriously affected, the sympathetic effects of the disease, as delirium, the sardonic spasm of the muscles of the countenance, singultus, dysphagia, anxiety, retraction of the hypochondria, spasm of the abdominal muscles, &c. are more constant and severe.

9. Diaphragmitis is sometimes complicated with, at other times consequent upon, acute rheumatism; and I believe that it may be associated both with inflammation of the convex and



posterior part of the liver, and with acute rheumatism, in the same case and at the same time. I am at present attending a patient, in whom there is every reason to infer the existence of this very complicated malady; and am of opinion that similar associations of the disease would have been more frequently remarked in practice, if the severity of the rheumatic pains, and of the remote symptoms caused by inflammation of the diaphragm, had not masked those more directly connected with the affected organ, and thereby misled the practitioner.

10. There are several symptoms which have been adduced by authors as pathognomonic of this malady, but which are not uniformly observed: thus, STOLL, AASKOW, and BOISSEAU have found delirium frequently wanting altogether: and, in several cases, in which I have seen the disease complicated with hepatitis and pleuritis, — particularly the former, — neither delirium, nor the cynic spasm, was present. I agree, however, with J. P. FRANK (*De Curand. Morb. Hom. t. ii. p. 193.*), in considering these symptoms as being more frequently met with in this disease, than in any other affecting the viscera of the large cavities, and particularly when the tendinous part of the organ is affected.

11. *C. Course and Termination.* — The course and progress of this disease are generally acute. If it terminate not in resolution within a few days, it produces either adhesion to the adjoining viscera, or disorganisation, followed rapidly by death. When adhesions form, signs of *chronic* disease of this and the adjoining viscera continue after the subsidence of the acute symptoms; but when disorganisation and gangrene supervene, the patient experiences, after a very few days, a sense of suffocation, sinking, with singultus, extreme frequency and smallness of pulse, faintings, &c., speedily followed by dissolution.

12. *D. The morbid Appearances* most frequently found after diaphragmitis are, effusions of coagulable lymph, or of sero-albuminous fluid, or of both, on either of the surfaces of the organ, generally with adhesions, more or less extensive, to the adjoining viscera; increased redness and vascularity, or deepness of colour, of one or more of the different structures composing the organ; false membranes upon its surfaces; portions of it ulcerated, or of a dark colour, softened, and nearly disorganised; and, more rarely, sphacelated in parts, infiltrated with pus, or containing one or more distinct purulent collections.

13. *iv. PROGNOSIS.* — Recovery from this malady should be considered as very doubtful, until we have very unequivocal symptoms of resolution, without any sign of the extension of disease to the organs situated on either side of the diaphragm. *a.* The circumstance of diaphragmitis arising from external injury, or the extension of inflammation from the pleura and pericardium; the early accession of urgent anxiety, followed by delirium; singultus, and sobbing; depressed, collapsed, and anxious countenance, with spasms of the muscles of the face; irregularity, intermission, and smallness of pulse; coldness of the extremities; leipothymia; difficult deglutition; frequent and irritable vomiting, and restlessness; absence of thirst; convulsions; convulsive, frequent, and laborious respirations, &c.; are very *unfavourable* symptoms. *b.* The subsidence of the urgent symptoms; an improved

state of the pulse, and appearance of the countenance; the occurrence of any of the critical evacuations, or restoration of the suspended secretions, or a sound and refreshing sleep; a more natural respiration, and the absence of serious disease of the collatitious viscera; are the most *favourable* circumstances.

14. *vi. TREATMENT.* — The intentions of cure are the same in this as in other acute inflammations. The antiphlogistic treatment promises us the principal aid; but to be successful, it must be employed early in a decided manner. Full *blood-letting* from the arm, the patient being in a semi-recumbent posture, until a decided effect ensues — until syncope approaches, but is not induced — as recommended in another place (see BLOOD, § 64.); afterwards *cupping* on the loins and back, on each side of the spine; *leeches* applied near the anterior insertion of the diaphragm; *purgatives*; refrigerating *diaphoretics*; febrifuge diluents; external fomentations and cataplasms: tepid baths; purgative, and subsequently emollient enemata, with complete stillness and silence; should be employed according to the exigencies of the case. The practitioner ought not to be deceived by the presence of singultus, and the great depression of the powers of life so frequently attendant on the disease; and thus be led to the exhibition of antispasmodics and stimulants, when opposite measures are requisite. Nor should he be induced by the state of the stomach, and of the matters discharged from it, to exhibit emetics. When vomiting is present, it should be allayed; and, for this purpose, as well as to prevent the formation of coagulable lymph and adhesion between the surfaces of the organ and the adjoining viscera, large doses of *calomel and opium* — from ten to twenty grains of the former, and from one to three of the latter, either with or without from one to three grains of *camphor* — should be exhibited, and repeated at intervals of six or seven hours; the first dose being given immediately after the first blood-letting. The danger of the disease requires prompt and powerful agents; and, after depletions, the combination of calomel, opium, and camphor, is particularly serviceable.

15. When the disease is associated with inflammation in the adjoining viscera, the calomel should be carried so far as to affect the mouth; and if the *pleura* or *pericardium* be also diseased, antimonials and diuretics ought to be added. If the convex or posterior parts of the *liver* and *peritoneum* be also inflamed, the use of mercurials are also required, and with nearly the same intentions, viz. to prevent adhesions, and procure the absorption of effused fluids. If the disease be associated with *rheumatism* or *gout*, then, after local depletions, active mercurial cathartics, and derivatives applied to the joints, colchicum, with large doses of soda or potash, or with magnesia, ammonia, or camphor, may be exhibited.

16. It often happens, that after the inflammation in this organ and its collatitious viscera is subdued, considerable irritability, evinced by the occurrence of singultus upon taking substances into the stomach, continues for some time. To remove this, the use of gentle tonics, combined with anodynes and antispasmodics, as the infusion of calumba, with opium, sub-carbonate of



soda, hyoscyamus, or camphor, is generally required, or of the infusion of valerian, or of the oxides of zinc, or the sub-nitrate of bismuth, or musk, &c. *Convalescence*, and the *regimen* of the patient, are to be managed precisely as in other inflammatory diseases.

#### 17. II. DIAPHRAGM, ORGANIC LESIONS OF.—

i. PERFORATION of the diaphragm is not an uncommon consequence of abscess of the liver, pointing up towards the thorax. In the great majority of such cases, adhesion of the adjoining surfaces of the liver and diaphragm has preceded the perforation; and, when this has been accomplished by the disorganising process following the inflammation excited in the diaphragm, the contents of the abscess pass either into the cavity of the thorax, or, adhesion of the inflamed diaphragm to the lungs having also taken place, into the lungs, whence it may be expectorated, and the patient even recover. (See LIVER—*Abscess of the.*) Instances have even occurred of the abscess having thus traversed the diaphragm, and opened into the pericardium.

18. Perforation of the diaphragm has likewise taken place from abscess of the spleen, and from ulcerations of the stomach, which had adhered to the diaphragm. It has very seldom been observed that the perforation of this organ has occurred in an opposite direction, namely, from the thorax downwards. But PORTAL (*Anat. Méd.*) met with a case, in which an imposthume of the lungs opened through the diaphragm, and burst into the abdominal cavity. The diaphragm may likewise be perforated in this direction by aneurism of the aorta. MECKEL also found *ulceration* of the diaphragm, apparently resulting from chronic inflammation, in the dissection of a maniacal patient.

19. ii. RUPTURE of the diaphragm sometimes occurs from falls; violent succussions of the trunk; vomiting, or severe retchings; blows on the abdomen, back, hypochondrium, or epigastrium; suppressed efforts, and sudden muscular exertions. M. PERCY states, that a young female, suppressing the pains of child-birth, uttered a plaintive cry, had her mouth hideously distorted, and shortly afterwards expired, giving birth to a child. On dissection, the diaphragm was torn obliquely in the fleshy part of the left side. Two thirds of the stomach, with a portion of the omentum and colon, had passed through the rupture into the thorax. On another occasion, M. PERCY found, after a fall, the ribs of the patient very prominent; the abdomen, at its upper part, sunk inwards; and the countenance presenting the risus sardonius. He prognosticated a rupture of the diaphragm, which was found after death. (PERCY, *Dict. de Scien. Méd.* t. ix. p. 214.) Rupture of the diaphragm is not necessarily immediately fatal. BOISSEAU (*Nosog. Organ.* t. ii. p. 623.) mentions a case, where a patient lived six months, and followed his occupations, after the occurrence. A person having taken an emetic, died soon afterwards with convulsions, the cynic spasm of the muscles of the face, &c. On examination, the tendinous part of the diaphragm was found torn near the part where the intercostal nerve passes through it.

20. iii. VARIOUS MORBID PRODUCTIONS have been found more or less intimately connected with the diaphragm, in persons who had experienced

disorder of the respiratory function. These have consisted of *tumours* of various descriptions, encysted or unencysted; *cartilaginous* or *osseous formations*, and *earthy concretions* in its surfaces (SCHREIBER, LEVEILLÉ, VOIGTEL); fleshy tumours; and large *fibrous cysts* containing hydatids (PORTAL), or merely an aqueous or serous fluid. It is not infrequently found partially *displaced* in aneurism of the heart and aorta. Cases of this description are recorded by VETTER and BLANCARD. It is also pressed high into the thorax by enlarged or suppurated liver.

21. iv. SPASMODIC ACTIONS.—The diaphragm contracts forcibly in crying, coughing, vomiting, during the expulsion of the excretions, child-birth, and tenesmus. It contracts slowly, but forcibly, and is rapidly followed by relaxation, in sighing. It contracts for a longer time, and is relaxed more quickly in yawning. The contraction is more rapid, forcible, and interrupted by closure of the glottis, in hiccup, sobbing, &c.; and sneezing is owing to convulsive contraction of the diaphragm, followed soon afterwards by convulsive action of the expiratory muscles. In all these, the other inspiratory muscles co-operate more or less energetically.

22. The motion of the diaphragm is generally more frequent, irregular, and unequal, than natural, in convulsive diseases, particularly when the irritation is propagated to this part, or influences the functions of the parvagus, by being extended to the top of the spinal chord, &c. This is evinced in epilepsy, hysteria, pertussis, &c. The contractions of the organ are still more disordered in tetanus, they being nearly permanent about the fatal close of the disease. Death is occasioned by this, rather than by any other circumstance; the permanent spasm of the diaphragm and other respiratory muscles preventing the expulsion of the inspired air, and consequently producing a variety of asphyxy. (See art. HICCUP.)

23. v. PARALYSIS of the diaphragm is incompatible with the duration of life, and can occur only during the last moments of existence. It may be induced by the inhalation of noxious gases into the lungs, and from virulent poisons, thus constituting another form of asphyxy: and it is produced by injuries of the medulla oblongata, or in its vicinity, or by whatever may interrupt the functions or injure the parvagus. I have met with a case where it followed, at a remote period, fracture by muscular action of the dentated cervical vertebra, as verified on dissection by Professor R. QUAIN and myself.

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DIARRHŒA. — SYN. (*Διάρροια*, from *διαρρέω*, I flow through, *διὰ* and *ρέω*). *Diarrhœa Cæcatoria*, *Rheuma Gastros*, Galen. *Rheumatismus*, Alexander of Tralles. *Defluxio*, Cælius Aurelius. *Alvi Fluxus*, *Ventris Profluvium*, Auct. Lat. *Cours de Ventre*, *Dévoiyement*, Fr. *Der Durchfall*, *Bauchfluss*, *Durchlauf*, Germ. *Diarrea*, Ital. *A Purging*, *Looseness*, &c.

CLASSIF. — 2. Class, Nervous Diseases; 3. Order, Spasmodic Affections (Cullen).

1. Class, Diseases of the Digestive Function; 1. Order, Affecting the Digestive Canal (Good).

1. DEFIN. — *Frequent, loose or fluid alvine evacuations, without tormina or tenesmus.*

2. Although diarrhœa may occur as an independent or unassociated complaint, yet may it supervene as an occasional or even common symptom, in several maladies. Dr. CULLEN, whilst he admitted diarrhœa as a specific disease, yet viewed it as always symptomatic of other pathological states. That it is so in most cases, cannot be doubted; but that it also is, in some instances, an *idiopathic* disorder, in respect both of its primary manifestation, and of its independence of inflammatory action of the intestinal mucous surface, or of disease of immediately related organs, is equally certain; and fully demonstrated by its causes and progress,—by the effects of treatment, and the appearances observed in fatal cases.

3. I. SYMPTOMS AND VARIETIES OF DIARRHŒA. — This disease is usually preceded by various dyspeptic symptoms, sometimes by slight nausea, frequently by uneasiness in different parts of the abdomen, by flatulence, and by pain, particularly before an evacuation takes place. In severe cases, the abdomen is somewhat distended, and tender to the touch, and its temperature increased; and occasionally the stools are preceded by much pain in the tract of the intestines, and accompanied with vomiting, or with fainting or leipothymia; they are always without effort, but are rarely involuntary. Each evacuation relieves for a time the patient's uneasiness, which, however soon returns. The discharges are usually copious, offensive, and feculent at first; but they soon become more scanty, watery, or mucous—often in proportion to the frequency of the calls to evacuation, after each of which the patient feels more and more weakened. Their number varies from three or four to twenty or thirty in the twenty-four hours, but they are not so often voided in the night as in the day. At the commencement of the attack, and in slight cases, the pulse is generally not materially affected; but when vomiting or much griping pain is present, it is often increased in frequency. At an advanced period it is usually small, weak, and somewhat accelerated; the countenance being pale, the body somewhat emaciated, the strength diminished, and the skin dry and very sensible of cold. The tongue is often loaded from the commencement in the middle and at the root, and sometimes is red at the point and edges. The urine is generally scanty throughout the complaint. The evacuations vary remarkably as to the nature of the matters composing them, their colour, consistence, smell, and other appearances, not only in different cases, but even in the same case, at different periods. Nosologists have generally

divided the disease into varieties or species, founded on the different states of the discharges. But this is not a satisfactory basis of classification, as the appearances of the evacuations do not depend upon definite pathological conditions, although furnishing important indications of the seat and state of disease. The most common of these appearances are, the *feculent*, which usually precedes the others; the *bilious*; the *mucous*; the *serous*; the *chylous*, or *white*; and the *lienteric*. But every practitioner must have observed that not only will these discharges present themselves during different periods of the disease, but that two or more of them may co-exist; thus, the evacuations are not infrequently, at the same time, bilious, mucous, and serous; or feculent, bilious, and mucous; or watery and bilious.

i. IDIOPATHIC DIARRHŒA. — CLASSIF. II. CLASS, I. ORDER (Author).

4. DEFIN. — *Copious, feculent, and frequent evacuations, sometimes preceded by griping, and unattended by fever.*

5. A. *Diarrhœa of Irritation*. — This form of the disease comprises most of the cases denominated feculent by authors, and termed *D. Stercorea* by SAUVAGES, *D. Crapulosa* by CULLEN, and *D. Fusa* by GOOD. (a) It is usually caused by any stimulating or irritating substance received into the stomach; by too great a variety or quantity of food or drink, or even by a small quantity of that which is unwholesome, or which may disagree with the patient's diathesis, or with the existing state of the digestive organs; by indigestible vegetables, particularly cucumbers, melons, salads, &c.; by various acid fruits, particularly plums, pine-apples, &c.; by acidities generated in the *prima via*, and the quality of the nurse's milk; and by dentition in infants.—(b) The symptoms in this variety are frequently nausea; severe griping pains before each evacuation; foul, or loaded tongue; copious feculent stools, afterwards becoming frothy, watery, or mucous, and exhaling an offensive or sour odour; the pulse and temperature of the surface being but little affected.—(c) This form generally ceases spontaneously, owing to the evacuation of the offending substances; and the digestive functions are soon afterwards restored, if its cause be subsequently avoided. It may, however, excite some of the other pathological states to which this disease has been ascribed, and be thereby prolonged; or it may terminate in organic change.

6. B. *Diarrhœa of Relaxation associated with Irritation* (*Diarrhœa à Cibis corruptis*, SENNERT) — (a) may be caused by whatever relaxes the tone of the intestinal mucous surface, or of its vessels, by its septic influence, whilst it excites the peristaltic actions of the tube, as stale fish, high game, or any animal food approaching to putridity, over-ripe or decayed fruit, stale vegetables, &c., and putrid, stagnant, marsh, or running waters containing animal matters or exuviae, or vegetable substances in a state of decomposition, or of minute division or solution, &c.—(b) The symptoms are, copious, feculent, offensive, and, in some instances, involuntary motions, becoming scanty, watery, and frothy, and preceded by borborygmi or gurglings in the abdomen—seldom by gripings or nausea; a natural or slightly foul, mucous, slimy, or clammy tongue; diminished temperature of the surface;



and a soft, weak, or a natural, or but little accelerated pulse.—(c) This variety either ceases as soon as the matters which occasioned it are expelled, or it assumes more severe characters. When it has been produced by unwholesome water, and particularly if this cause continues to operate, it frequently passes into the *mucous* variety, or into dysentery, or into a chronic state; and sometimes a low remittent form of fever supervenes, terminating in disease of the mucous follicles, and ulceration of the bowels, &c.

ii. SYMPTOMATIC DIARRHŒA. — CLASSIF. III. CLASS, I. ORDER (*Author*).

7. DEFIN.—*Frequent, and generally morbid, alvine evacuations, from disease of the bowels or collatitious viscera, often attended by fever.*

8. A. *Diarrhœa from acrid, or an increased Secretion of, Bile* (the *D. Biliosa*, of authors).—*a.* Bilious diarrhœa is a very common variety, particularly during summer and autumn, and amongst Europeans who have recently migrated to warm or intertropical countries. It also frequently occurs in persons who live intemperately, in respect either of eating or drinking; and in those who are harassed by anxieties or the depressing passions, especially if they be of the melancholic temperament. It may be induced also by violent fits of anger, or other intense emotions: an aperient or purgative medicine may even excite it, if the biliary organs be loaded at the time with morbid or acrid bile, and the liver be in an excited state. It appears probable that irritation of the duodenum, in the vicinity of the common duct, may be propagated to the liver and pancreas, occasioning an increased secretion both of bile and of pancreatic fluid; and that, whilst such irritation augments the vermicular action of the upper part of the intestinal tube, thereby accelerating the passage of the chyme along it, the quantity or quality of the secretions poured into the duodenum excites the internal surface of the bowels, increasing both their secreting and contractile functions.—(b) The *evacuations* in this form of diarrhœa are at first feculent, and commonly of a green or greenish yellow, or even bright yellow colour: they afterwards become more fluid and watery, vary in colour, and are mixed with thin feculent matter. If the diarrhœa continues, they frequently contain yellowish or greenish yellow mucus, either in large thick masses, or in thin, glairy, or gelatinous pieces, which fall to the bottom of the pan, and admit of being drawn into long filaments; or they consist chiefly of a serous fluid, coloured by the bile, and presenting either a glairy mucus or albuminous flocculi, evidently owing to the irritation caused by the acrid bile having been followed by increased vascular action in the intestinal mucous surface, and an excited state of its follicles.—(c) In this case, *bilious* may pass into *inflammatory* diarrhœa, in either of its forms, as constituting the two following varieties; or into dysentery.

9. B. *Diarrhœa from Determination to, or increased vascular Action in, the intestinal mucous Coat—Inflammatory Diarrhœa* (the *D. Serosa*, of SAUVAGES, GOOD, &c.; *D. Aquosa*, of HOFFMANN).—(a) This variety is caused by whatever occasions a greater flux of blood to the intestinal mucous surface, and a freer exhalation and secretion than are natural, by obstructing these functions on other surfaces: as the application of

cold, in any form, to the cutaneous or pulmonary surface, or to both at once; various mental emotions, as anxiety, fright, surprise, &c.; or even the slightest agitation of mind in some constitutions; cold acid beverages, or ices, taken when the body is overheated or perspiring; the suppression of chronic eruptions, or copious or accustomed perspirations or discharges; the disappearance of abscesses, drying up of old sores, and checked menstruation or lochial discharge.—(b) The *evacuations* are watery or serous, mixed with thin feculent matter, and exhibit every shade, from a dark brownish, or greenish brown, to a pale, greyish, or whitish colour; and they contain, in some cases, pieces of thick gelatinous mucus, or a thin, glairy, and stringy mucus; in others, whitish albuminous flocculi; and, in a few instances, large membranous or albuminous shreds or flakes, moulded on the internal surface the intestine, constituting the *D. Tubularis* of Dr. GOOD. The discharges in this variety are often preceded by sickness or vomiting; by severe griping pains in the abdomen; and are attended by a dry, harsh skin; increased temperature of the trunk; a flatulent state of the bowels; a small, frequent, constricted, but soft pulse; a furred or loaded tongue, particularly towards the root, with red edges and point; and scanty, high-coloured urine. The patient also often complains of an aching, dull pain in the abdomen, sometimes increased by heavy pressure.—(c) Inflammatory action may not exist in every case of this variety; or it may not supervene until after simple determination of blood to, or irritation of, the mucous surface has continued for some time; and, even when present, it does not necessarily occasion the diarrhœa. This variety, occurring in *infants*, constitutes what is usually called the *watery gripes* (§ 15.), and sometimes gives rise to one or more intus-susceptions; or it passes into chronic diarrhœa, with disease of the mucous and mesenteric glands; or into slow remittent fever, marasmus, and fatal exhaustion.

10. C. *Diarrhœa from excited or inflammatory Action of the mucous Follicles* (*Catarrhus Intestinorum*, of various authors; *D. Catarrhalis*, of BOERHAAVE; *D. Mucosa*, of CULLEN, GOOD, &c.; *Cœliaca Mucosa*, SAUVAGES).—(a) This form generally appears in the course of functional disorder of the digestive organs, particularly indigestion, hypochondriasis, costiveness, and colicky affections; which may be viewed as predisposing to it, by favouring the accumulation of mucous sordes in the follicles and on the internal surface of the bowels; and is excited by the causes already enumerated, especially those of the preceding variety (§ 9.). It occurs most frequently in old persons, or in those who have suffered from chronic disorders of the digestive organs; and in *children*, particularly during the period of first dentition.—(b) The *stools* often consist entirely of thin gelatinous mucus; frequently, also, of thick mucus, and a considerable quantity of watery or serous fluid; sometimes the mucus is mixed with this fluid and thin feculent matter, or is accompanied with small pellets of fæces; and occasionally it has the appearance of a semi-transparent mucilage, passing into a muco-puriform matter. The consistence of the motions varies much; and in some cases they are very offensive, but in others without any odour.



In many instances they have a greenish or yellowish green colour; in others, an orange or yellow tint: in a few cases, they are nearly colourless, or white, and thin, constituting the *D. Alba* of HILLARY; the *Fluxus Cœliacus* of some writers; the *Album Alvi Profluvium* of PRISO; the *D. Pituitosa* of SAUVAGES; the *D. Cœliaca* of CULLEN; the *D. Chylosa*, or *Lactea*, of several authors. These appearances are chiefly attributable to the morbid action of the mucous follicles in some part of the digestive tube, most probably in the colon; to the presence or absence of the biliary and pancreatic secretions; and to the states of these secretions. This, as well as the preceding variety, may or may not be attended by febrile symptoms, may assume the acute character, and may pass into the chronic form, the mucous discharges in this latter case often presenting a light, whitish, or muco-puriform appearance.—(c) When mucous diarrhœa continues for some time, or becomes chronic, it occasions emaciation; a dry, harsh, or foul skin; and, in children, gives rise to marasmus, disease of the mesenteric glands, &c. When it becomes *chronic*, the stools sometimes assume a whitish, or mucilage-like, or greyish appearance, evincing the absence of bile; or they pass into a muco-puriform state, occasionally streaked with blood; or they contain long whitish shreds, or threads; and consist either altogether of these matters, particularly if the disease be seated low in the large intestines, or of an admixture of thin feculent matter with them, particularly when the upper portions of the colon and termination of the ilium are affected. In some cases of this form, occurring during difficult dentition, or after the use of calomel or mercurials, or upon the suppression of ptyalism, the stools have consisted of a thin, ropy mucus, of a translucent hue, and have seemed to be chiefly augmented pancreatic secretion. In *children* especially, when mucous diarrhœa has assumed the *chronic* form, the evacuations often present the *chylous* or milky appearance just noticed,—the *Chylous Diarrhœa* of DEWEES and others. This state is attributed by them to the presence of chyme, or imperfectly elaborated chyle, which the lacteals refuse to absorb; and to the absence of bile: to which causes it is very probably partly owing, as well as partly to the morbid secretions of the mucous surface and follicles. Whatever appearance this variety may assume, it is frequently followed by the next.

11. *D. Diarrhœa from Ulceration of the mucous Follicles*—(a) occurs either consecutively of the two foregoing varieties, or in the course of several febrile or chronic diseases; in which cases, however, it is very often preceded by serous or mucous evacuations, or by both. But ulceration may take place without any such indication, and without the bowels being much, or even at all, relaxed.—(b) The stools are usually muco-puriform, streaked with blood; sometimes containing shreds or threads of albuminous matter; and mixed with thin, watery fæces, particularly when the disease is seated in the small intestines or cæcum. When the large intestines are chiefly affected, the muco-puriform discharges may contain little or no feculent matters; or these matters may form distinct portions of the stools, or may consist of detached pellets. In

some instances, the stools have been very dark, grumous, watery, and foetid; and, occasionally, merely thin, serous, or mucous, or both, varying in colour, and more or less feculent and offensive; and yet ulceration has nevertheless existed. In rarer cases, they have been quite black, grumous, and melanoid; or resembling ink, probably from the admixture of blood exuded in the small intestines, and changed by the action of the secretions—whether healthy or morbid.—(c) In this variety of diarrhœa, the emaciation becomes extreme, and the skin assumes a dry, harsh, foul, or lurid appearance. The pulse, in its latter stages, is quick, small, and weak. Aphthæ sometimes appear on the lips and tongue; and hectic fever, with exhaustion, prevails.

12. *E. Diarrhœa with the Discharge of unaltered Ingesta*; *Lientery* (Λιεντερία, Gr.; *Lubricitas*, vel *Levitas Intestinorum*, Lat.; *D. Lienterica*, of CULLEN; the *Lienteria* of SAUVAGES and others)—(a) occurs more frequently, in *children*, before the period of the second dentition, than at later epochs; and it is generally the consequence or sequela of inflammatory irritation of the digestive mucous surface, and disease of the mesenteric glands—of the advanced stages of these pathological states. It is most common during the first dentition, particularly when the canine and molar teeth are about to appear; and, in this class of patients, as well as in adults (in which latter it is comparatively rare), it either follows dysentery, or is a concomitant of the last stages, or chronic states, of one of the preceding varieties—commonly of the *serous* or *mucous*—than a primary form of the disease. It is *caused* by the same remote agents which induce these its primary conditions; and it evidently depends upon a similar state of increased peristaltic action, and deficient vital function, of the stomach and duodenum, to that which obtains in the intestines; the food being thereby propelled onwards before it has undergone the changes usually produced by these organs, and discharged from the bowels but little altered from the condition in which it passed into the stomach.—(b) The appetite is usually voracious in this variety, particularly in children, although the emaciation and debility may be extreme. The biliary secretion is also deficient or vitiated; and, in some cases, it appears nearly or altogether wanting in the stools, owing rather to the weak or imperfect action of the liver, than to obstruction.—(c) It usually terminates in stupor, and death from exhaustion; although recovery sometimes takes place when it is early and judiciously treated.

13. II. OF CERTAIN RELATIONS AND MANIFESTATIONS OF DIARRHŒA.—i. The *Causes* of this disease have been noticed in the description of its different varieties.—(a) Diarrhœa is most frequent in *childhood*, particularly during dentition, and in persons of a weak constitution and lax fibre; and in those addicted to spirituous liquors. I have observed a tendency to it in some families—sometimes in all the children of a family, one of the parents being possessed of the same liability.—(b) It is *endemic* in some places, evidently owing either to their humid, close, and miasmal situation, or to an impure state of the water, especially in large cities or towns; or to the nature of the food in common use.—(c) The *epidemic* prevalence of diarrhœa



has been noticed by BARTHOLINUS (*Hist. Anat.* cent. ii. his. 65.), SYDENHAM (*Opera*, p. 160. 209.), and LEICHNER (*De Diarrh. quadam Epid.* Erf. 1676.); and, in some summers and autumns, its frequency has been so great, within my own experience, especially in children, as to justify me in stating that it sometimes assumes this form.—(d) It has also occasionally put on a *periodic* character, particularly when it has arisen from endemic causes, and been connected with a masked or latent intermittent. It has appeared monthly, in females whose menstrual discharges have been suppressed, — and thus constituted a substituted evacuation.

14. ii. *Puerperal Diarrhœa* may occur either very soon, or a few days, after delivery. It is occasioned by a neglected state of the bowels previously — by the irritation of collected fæces, or by the irruption of morbid secretions into the intestines. When it proceeds from the former cause, the evacuations are feculent, lumpy, offensive, and attended by some degree of tenesmus; when from the latter, it is often accompanied with sickness, or vomiting, and sometimes with cramps of the lower extremities; the stools being fœtid, bilious, dark green, or greenish yellow, with whitish flakes floating in them. It may be connected with suppression of the lochia, or of the milk; but, in such cases, it is rather the cause than the effect of the suppression. It commonly originates in one of the states of disorder now mentioned, or in both. When, however, such a degree of irritation of the bowels is produced, as will be followed by excited vascular action, suppression of either the milk or lochia, or both, may follow, with more or less febrile commotion. Cases of this description usually do not supervene until a few days after parturition; and are attended by the phenomena of serous or inflammatory diarrhœa, with disordered biliary secretions, offensive dark stools, with albuminous whitish flakes or flocculi, quick pulse, and symptomatic disorder of various functions, favoured by the puerperal state. The more strongly marked cases of this form of disease pass into and constitute what has been termed *Intestinal Fever* by BURNS and others. (See *FEVERS of the Puerperal State*.) The slighter cases even not infrequently terminate in chronic inflammation of the intestinal mucous surface, with all the symptoms of mucous diarrhœa, or of ulceration of the follicles, or of dysentery.

15. iii. In *Infants and Children*, diarrhœa is remarkably frequent, — especially from the commencement of dentition, or the time of weaning, to the third year of age; and is, in respect both of its phenomena and of its contingent effects, a most important disease. These states of it which are identical with those generally observed in the adult, have already been noticed, particularly the *serous*, *mucous*, and *lienteric*. — *a*. The first of these, in the form of *watery gripes*, may appear previously to the period of dentition; and then it is connected with the state of the nurse's milk, or too early or over feeding, which induces acidity of the *prima viâ*; with either inflammatory excitement of, with augmented secretion from, the mucous surface, or increased and irregular action of the muscular coat, or both. In either case, the disease may be very *acute* — may run on to unequivocal inflammatory action, and may

occasion intusceptions, with scanty, dark, watery, or mucous and bloody stools, terminating in convulsions and death; or it may be prolonged into the *chronic* state, owing either to neglect, to the continuance of the causes, or to injudicious treatment. When it lapses into this state, the evacuations become very offensive, watery, of a dark green, brown, or curdly appearance; are preceded by severe griping; and are voided suddenly and violently, frequently with much flatus and straining. In these cases, there are also more or less febrile symptoms; and, in its advanced stage, often a raw or aphthous state of the mouth; the disease assuming the *lienteric* form, or occasioning rapid exhaustion. In such cases, morbid secretions, and knotty or curdly fæces, frequently are retained about the sigmoid flexure of the colon; and fatal cases generally present the termination of the ilium, the cæcum, and lower part of the colon, more or less changed in structure; or exhibit, along the greater part of the digestive canal, the appearances usually consequent upon inflammatory action of the mucous surface.

16. *β*. Diarrhœa is also very common in delicate children, at the *period of weaning*; and, in many cases, is connected also — although not necessarily — with the irritation of difficult dentition. It usually assumes a *chronic* form; and is most severe and most rapid in its progress in infants who have been much too early or abruptly weaned, and improperly fed at the time, or afterwards. This form of diarrhœa was described very minutely by Dr. CHEYNE, under the term "*Atrophia Ablactatorium*," or "*Weaning-brash*;" and afterwards by CRUEILHIER, ANDRAL, and others. The evacuations are usually greenish, watery, or slimy; sometimes ash-coloured and *lienteric*; and attended by griping pains, often by retchings and vomiting, with symptomatic fever. The appearance of the stools, however, varies very remarkably; but they generally partake more of the serous, bilious, or *lienteric* characters, than of any others: thereby indicating, what, indeed, is displayed on dissection, namely, the inflammatory nature of the disease, and its extension along the alimentary canal, and even to the liver. It usually occurs during summer and autumn, particularly when the seasons are moist and hot; and is seldom of shorter *duration* than four or five weeks, or longer than three or four months. It is evidently a milder grade of the same pathological states which give rise to the disease I have described under the name of *Choleric Fever of Infants*: and, although it is connected in its advanced stages with inflammatory action, yet it is very probable that the inflammation is of an *asthenic* kind; and that it originates in irritation produced by acrid and morbid secretions, and by imperfectly digested and improper food, or by an unhealthy state of the nurse's milk. It is attended by great emaciation and debility, and frequently terminates in fatal intus-susceptions, convulsions, or coma from exhaustion, or serous effusion within the head, or from both.

17. *γ*. In rarer instances, a *peculiar form* of diarrhœa occurs after weaning, in which the stools are not so very frequent or abundant, but they are pulpy or semifluid, of a clayey colour, and very offensive; and accompanied with an abund-



ant secretion of pale, ammoniacal, albuminous, and fœtid urine,—both the stools and urine emitting a nearly similar smell. The abdomen is full and soft; the skin generally cool; the mouth, lips, tongue, and fauces are red; and the debility great: emaciation rapidly follows; and, in some cases, the bones yield from the absorption of the phosphates which are probably carried off by the urine; the disease partaking as much of the characters of diuresis, or *albuminous diabetes*, as of diarrhœa. A bilious form of diarrhœa may also occur as a symptom of incipient disease of the membranes of, or effusion into, the ventricles; or irritation about the origin of the nerves.

18. iv. The *Dark Races* of our species, particularly the *negro*, are much more liable to diarrhœa than the white; and in them it usually assumes a chronic state, and frequently the mucous form. It also very commonly presents *asthenic* characters, is often *complicated* with intestinal worms, and is prone to pass into dysentery, or to be followed by rapid depression of vital power.

19. III. ASSOCIATIONS OF DIARRHŒA.—(a) This affection may attend the commencement of dangerous maladies, particularly fever, dysentery, pestilential cholera, hepatitis, meningitis, &c., owing to irritation of the mucous coat of the intestines, to the flow of morbid or acrid secretions into them, &c., the evacuations being feculent, bilious, mucous, or serous.—(b) Its occasional association with gout has been noticed by SYDENHAM, BAGLIVI, MUSGRAVE (*De Arthrit. Anom.* cap. 4.), and LORENZ; and has given rise to the *D. Arthritica* of SAUVAGES. In *children*, it is very often complicated with bronchitis, especially during dentition. It may constitute a serious, or even dangerous, *complication* in low remittent or continued fevers, in scarlatina, small-pox, measles, hepatitis, &c.; and may proceed either from determination of vascular excitement to the abdominal viscera, particularly the intestines; or from inflammation, ulceration, &c. of the mucous coat in some part of the canal, especially after retrocession, or repulsion of the eruption in the exanthemata; the stools being serous, dark-coloured, with whitish flocculi or flakes, or mucous, and sometimes bilious. It is also often associated, in its chronic states, with mesenteric disease and worms.—(c) It may be *critical* in several febrile and inflammatory diseases; the discharges being bilious, homogeneous, &c. (See *CRISES*, § 8.)—(d) It is also frequently *colliquative*, or the result of exhaustion of the constitutional powers from protracted disorganising disease—as pulmonary consumption, chronic abscesses, diseased joints, hectic fever, and morbid states of the blood, caused by the absorption into it of purulent or other matters generated in any part of the body. In such cases, it more directly depends upon disease affecting particularly the mucous follicles, the tone or vital cohesion of the mucous surface and vessels supplying it being diminished; and the evacuations being mucous or muco-puriform, or serous and grumous, or sero-puriform and partly feculent. Colliquative diarrhœa is also frequently dependent upon ulceration, apparently commencing in the follicles, and often without any evidence of antecedent inflammatory action, at least of a sthenic kind.

20. IV. DURATION, TERMINATION, AND APPEARANCES ON DISSECTION.—A. Diarrhœa, particularly in its idiopathic state, is generally of short *duration*; but bilious and mucous diarrhœa may be much longer protracted. I have seen the former continue, in a warm climate, for several months; and, in this country, nearly as long, sometimes with short remissions. The *serous* and *mucous* varieties often assume an *acute* character, in respect both of intensity and duration; but they frequently also, particularly the latter, degenerate into the *chronic* form; either retaining their specific distinctions, or assuming those of ulceration or lenteria. When the disease has even been cured, there generally remains during life a liability to its return, particularly when it has passed into the chronic state, and has possessed the *mucous* character. A slight diarrhœa may continue the greater part of life, and at last pass into dysentery.\*

21. B. Diarrhœa may *terminate*—(a) in *dysentery*, from an increased affection of the large bowels, frequently connected with inflammatory action or ulceration of their mucous surface and follicles, and spasmodic action of the lower part of the colon: (b) or it may run into *enteritis*, or even *peritonitis*, particularly when it commences in the serous form, owing to the extension of inflammation from the internal to the more external coats of the intestines; or to the perforation of them by ulcers; and it may end in abdominal dropsy: (c) or it may give rise to *convulsions*, to intus-susceptions, particularly in children: and (d) it may assume the *chronic* form, varying in severity and duration, and occasioning mesenteric disease, emaciation, and exhaustion; and it may be prolonged even for years, with irregular remissions and intermissions.

22. C. The *appearances* on dissection can be ascertained only in severe or chronic cases, or in those who have died of its complicated states; or of some other disease on which diarrhœa had supervened, or with which it was associated. In some recent or slight cases, the *mucous coat of the intestines* has been found quite pale and bloodless; and the follicles, only, more developed than usual. In others, it has been somewhat softened, or merely injected; occasionally it has been congested and discoloured, the injection or congestion generally existing in patches or streaks, between which it has been quite pale. In more chronic and severe cases, it has likewise been pale, anæmic, and softened; in some, inflamed, congested, and of every shade, from a rose tint to a brownish or purplish colour—commonly in streaks or patches. In some instances, either without, or in addition to, these and other appearances about to be no-

\* Some years ago, I was consulted by a well-known and eminent person, past the middle age, of the sanguine temperament and plethoric habit of body, and a rigid water-drinker, who had always had diarrhœa—at least for twenty years. He was directed to be blooded; and the diarrhœa was moderated merely, without being checked, when it became unusually troublesome, as apoplexy was dreaded, and as he was otherwise in excellent health. Soon afterwards, he went to South America, where the diarrhœa passed into acute, and, afterwards, chronic dysentery, which reduced him, from a full and almost corpulent habit, to a state of extreme emaciation. In this state he met with a dangerous accident, from which he lost so much blood that he rallied with difficulty. He recovered, nevertheless: the dysentery was cured; and the diarrhœa, upon my seeing him again in London some years afterwards, had not returned.



ticed, the mucous and *submucous* tissues have been œdematous, thickened, and very much softened. Inspissated mucus, or even coagulable lymph, and more frequently a thin, brownish or greyish, or puriform mucus, have been found covering the diseased surface. In some cases of children, the intestines have become soft, white, almost diaphanous, and easily torn; and have contained a purulent, custard-like matter. Their calibre, in a few instances, has been greater than usual; but much more frequently diminished, or even much and irregularly contracted, particularly in the part chiefly affected. In some instances, small pustules containing purulent matter have been observed, apparently unconnected with the follicles; and, upon breaking, have left merely a slight, superficial, and reddish ulceration, or excoriated-like surface (BRIGHT and myself). Both the small and large intestines have occasionally presented one or more intussusceptions — sometimes a number, especially in infants and children; and, in fatal cases, soon after weaning, softening, with or without inflammatory appearances, has often also existed in the *stomach* and *liver*. The intestines have been, in some instances, of a darker hue than natural, externally as well as internally; either in large portions, or throughout, and occasionally in thickly disseminated dots or points. The *mucous glands*, particularly in severe or chronic cases, and those belonging to the mucous and *lienteric* varieties, have been very generally found either prominent, enlarged, inflamed, or the seat of ulceration, or of a dark or blackish colour, by BRUNNER, STARK, LIEUTAUD, BANG, ABERCROMBIE, BRIGHT, ANDRAL, ANNESLEY, and myself. Fungoid ulcers in the situation of the follicles, often with prominent and inflamed bases, have likewise been observed by these writers. BRUNNER (*De Gland. Duodeni*, &c.) noticed their prominent and enlarged state in the duodenum; and STARK (*Klin. Bemerk. &c.* p. 7.) principally in the large bowels. I have often observed them enlarged, or otherwise diseased, in the former of these situations, in cases of the *lientery* and *atrophy* of children; but those of the *cæcum*, of the termination of the *ilium*, and of the *colon*, are more frequently affected in this class of patients. The *mesenteric glands* are often inflamed, or enlarged, or indurated, particularly in young subjects, and in chronic and *lienteric* cases. The *gall-bladder* sometimes contains greenish bile; and the *liver* is occasionally more vascular than natural. The parts most commonly or most severely diseased are the *ilium*, especially its lowest third, and the *cæcum*. The absence of any appreciable lesion in some cases, and the slight nature of those observed in others, militate against the doctrine of BROUSSAIS as to the universal dependence of diarrhœa on inflammation of the intestinal mucous surface. He, however, contends that the blood had retired, in such cases, from the inflamed capillaries into the veins, at the time of, or after, death; thereby leaving no traces of inflammation observable on dissection. This change may occur in vessels that are simply excited, or after *erethism* merely of the mucous coat (states most frequently attendant upon slight diarrhœa); but not when inflammation has actually existed. (See DIGESTIVE CANAL — *Pathology of*.)

23. V. DIAGNOSIS. — (a) Diarrhœa is dis-

tinguished from *dysentery* by the *tormina* and *tenesmus*; the scanty, mucous, and bloody evacuations; and the more early and marked febrile symptoms, of the latter. In it, the calls to stool are almost incessant and abortive, and the motions are nearly destitute of *feces*, or sometimes contain *scybalæ*. In the former, the griping pains, even when most severe, never equal the *tormina* of *dysentery*; of which the distressing *tenesmus*, the quick pulse, the increased frequency of the calls to evacuation during the night, the presence of *strangury*, are also pathognomonic. — (b) Diarrhœa differs from *cholera*, in the much less severity of attack; by the absence of spasms of the extremities; by the entire absence, or occasional occurrence merely, of nausea or vomiting; and by the milder character and less rapid progress of the former. *Bilious diarrhœa*, however, is sometimes merely a slighter form of *bilious cholera*; the existence of spasms in the latter constituting the chief difference, excepting as to grade: and *pestilential cholera* very frequently commences in some one of the common forms of diarrhœa. — (c) Diarrhœa differs, in certain of its varieties — especially the fourth, fifth, &c. — but little from inflammation of the internal surface of the intestines, excepting as respects the activity or acuteness of the affection, and the extent to which the constitution sympathises with the local disease. But although certain states of diarrhœa are chiefly owing to inflammatory action, still this action is attended by increased exhalation and secretion from the mucous surface, whilst inflammation, either limited in extent, or of a low grade, may exist in this situation, and particularly in the follicles, without the *alvine* evacuations being either frequent or increased, and even in some instances they may be constipated. It is chiefly from the quickness of the pulse, and the evening accessions or exacerbations of fever; from the sensations of the patient on pressing and examining the abdomen; from the temperature and state of the skin, particularly in this situation; and from the whitish, furred, or reddish appearances of the tongue, and the state of the discharges; that the existence of inflammation of the mucous surface or follicles of the intestines, in diarrhœa, or independently of diarrhœa, can be inferred.

24. THE PROGNOSIS. — (a) of *idiopathic* diarrhœa is generally favourable: it is usually slight, and soon subsides after the removal of the offending cause. There are, however, few disorders that will be more readily aggravated, or converted into a more serious disease, by injudicious treatment. — (b) The *symptomatic* varieties of the complaint are to be viewed entirely as respects the pathological states which occasion them. The *serous* and *mucous* forms, especially when they assume the *chronic* state, or occur in children after weaning, should always be considered as serious affections, and a cautious prognosis ought to be given. The varieties referred to ulceration, and to the appearance of undigested substances in the stools, are very dangerous diseases, requiring the most judicious medical treatment and regimen; and, even with these advantages, the larger proportion will terminate fatally. — (c) The *complicated* states of diarrhœa, unless those attending the commencement, or marking the crisis, of diseases, are all more or less serious or unfavourable, espe-



cially colliquative diarrhœa. The degree of danger they portend is particularly noticed in the articles on the maladies with which they are most commonly associated. In all the forms and states of this complaint, the causes, the effects of previous treatment, and the constitution, the habits, and existing state of the patient, ought to be carefully considered before we form an opinion of the ultimate issue.

25. VI. TREATMENT.—i. Of IDIOPATHIC DIARRHŒA.—A. The *Feculent form*, or *Diarrhœa of Irritation*, when recent, requires demulcents or diluents merely, in order to facilitate the discharge of acrid or accumulated matters. This having been accomplished, disorder soon ceases. But the irritating substances may be partly retained, and keep up a prolonged, or remitting, state of disease, with griping pains and scanty stools, which may be partly feculent, mucous, or serous—the latter predominating when the irritation is considerable. In this case, much discrimination is requisite in selecting the aperient which is obviously required; for, if it be insufficient, the disorder will be prolonged; if it be too active, either super-purgation or inflammation will be occasioned. In such cases, a moderate dose of fresh castor oil; or the compound infusion of senna with manna, tartrate of potash, and an aromatic, sometimes with tincture of hyoscyamus; or, when the stomach is not irritable, rhubarb with magnesia and a grain of ipecacuanha, in aqua pimentæ, &c., will generally have the desired effect. In some circumstances, five or six drops of the tinct. opii, in the aperient draught, will both moderate its operation, and render it more effectual. If hyper-catharsis be occasioned by the purgative, a full dose of laudanum, or from one to two drachms of the old paregoric elixir, with external warmth, &c., will soon calm the irritation. When the bowels have been previously constipated, and there is any tension, or hardness, or fulness of the abdomen; or when the stools are partly fecal and partly mucous, or dark-coloured, serous, and muddy; a mild purgative, such as already advised, will be necessary. The practitioner should take into consideration the habits of the patient as to exercise and modes of living, and every argument for or against the existence of accumulated feces in the bowels, and be thereby guided in his practice. When he observes sufficient indications to warrant the exhibition of a purgative, the effects produced by it, the persistence of the irritation, and the state of the abdomen and of the evacuations, will influence him as to the propriety of repeating it, or of prescribing other medicines. If the first purgative have not produced a satisfactory effect, if there be no tenesmus, and if the stools are not very mucous, it will generally be advisable to give a full dose of calomel and of James's powder at bed-time, and either of the purgative doses already noticed early in the morning. When this form of diarrhœa appears to have arisen from acidity in the *primæ viæ*, particularly in *children*, with green, spinach-like, or knotty or scybalous evacuations, a full dose of calomel, or hydrarg. cum creta with magnesia, or magnesia only in anise-seed water, followed by castor oil, will generally be effectual.

26. B. *Diarrhœa from Relaxation*, or from the septic and irritating operation of the injurious ingesta, either solid or fluid, mentioned above (§ 6.), requires demulcents combined with aromatics,

particularly the confect. aromatica, capsicum, and other hot spices. If the action produced by the offending substances on the bowels have been sufficient to have procured their complete discharge, this may be all that is necessary. But if we suspect, from the associated phenomena, that a part of them has been retained, the treatment now advised for the removal of fecal matters should be adopted, with the addition of the aromatics and restoratives just mentioned, in quantity proportionate to the urgency of the case. In cases of diarrhœa arising from putrid matters, capsicum is almost a specific, especially when it is occasioned by fish: burnt brandy is also beneficial in these, after the offending matters have been expelled. When either of the foregoing varieties passes into the *chronic* state, the same treatment will be requisite that is recommended for the chronic mucous form of the disease (§ 30, 31.).

27. ii. Of SYMPTOMATIC DIARRHŒA.—A. The *Bilious variety* should be treated with strict reference to the presence of griping pains, and the colour of the stools. In this disorder, calomel has been much too indiscriminately prescribed. In every case of it, the existence of pain or of heat about the region of the liver, about the the shoulder blades, &c., or of fulness in the epigastrium, should be ascertained; and, if these exist in any degree, the treatment should be commenced with blood-letting, or cupping, or leeches on the præcordia or hypochondria. An excited state of the substance of the liver may be present, without any increased frequency of pulse or heat of skin; therefore the absence of fever should not prevent the adoption of depletion, which may even be repeated. Next in importance to depletion, is the use of demulcents, lubricating infusions, or diluents with nitre and sub-carbonate of soda, and small doses of antimony, or of camphor, particularly if the papillæ of the tongue be erect, and the stools are not offensive, nor dark or greenish coloured. If they be either, or both, and if the tongue be foul, a full dose of blue pill, or hydrarg. cum creta, may be given, and followed by castor oil, or any other purgative already mentioned, or by the medicines of this kind in the Appendix (F.96.205.430.). When the bile, from either its acidity or its quantity, occasions much irritation, the rectum becomes often excited to spastic constriction, thereby preventing the discharge of fecal and more consistent matters, and occasioning tenesmus, or superinducing dysentery. In order to prevent this, or to remedy it at its commencement, the refrigerating demulcents just noticed may be associated, or alternated, with cooling laxatives, and the retention of the morbid secretions in the colon guarded against, and their irritating properties diminished by emollient enema. The too early exhibition of astringents or opiates is often injurious in this variety; for, although they may afford relief for a few days, and the patient may think himself cured, yet he will soon afterwards complain of uneasiness in the abdomen and region of the liver, with fever, foul or furred tongue, and all the symptoms of hepatic disease, which may be soon followed by inflammation of the substance of the liver, or dysentery. When we suspect that the diarrhœa has been induced or kept up by irritation in the duodenum, the treatment above recommended is quite appro-



priate; and the refrigerants already prescribed, with demulcents and a mild and low diet, should be continued sufficiently long to take effect. Bilious diarrhœa may accompany *difficult dentition*; and in this case, lancing the gums, and the treatment advised in that article, should be adopted.

28. *B. Diarrhœa from Vascular Excitement*, or *Serous diarrhœa*, should be treated with reference to the cause which produced it.—(a) If it have arisen from the irritation of morbid matters, and if the symptoms indicate their partial retention, laxatives or mild purgatives are requisite; but it will not always be safe to exhibit them until general or local depletions, especially leeches applied to the anus, warm baths or fomentations, and demulcents with refrigerants, have been employed. Any of the *mild purgatives* recommended above, or F. 790., may be afterwards exhibited, and their action promoted by demulcent and aperient enemata.—(b) When, however, neither fœcal nor other injurious matters are retained, depletions should be accompanied with, and followed by, the internal exhibition of the nitrate of potash, with sub-carbonate of soda, and tincture of hyoscyamus (F. 838.), or tinct. opii comp. (F. 729.), or the paregoric elixir, in demulcent vehicles, (F. 728. 866.); and, if nausea be not present, with vinum ipecacuanhæ.—(c) When this form of affection arises from checked perspiration, diaphoretics, diluents, the warm bath, a warm bed, and mild, demulcent or farinaceous diet in small quantity, will generally remove the disorder in a very short time. If it be attended by any heat of skin, or acceleration of pulse, the liquor ammoniæ acetatis, nitrate of potass, and camphor julap (F. 865. 871.), will be of much service.—(d) If the motions be frothy, or emit a sour smell, the chalk mixture with ipecacuanha and opiate, or aromatic confection, will be requisite; and if griping pains with tenesmus be complained of, the pulv. ipecacuanhæ comp. with sub-carb. of soda, mucilage, oleum anisi, and aqua pimentæ, may be given; or the old paregoric elixir (F. 728.) in chalk mixture, and assisted by small emollient and anodyne clysters.—(e) These will generally soon remove the complaint; but when it has become more *chronic*, or is very severe at the outset, or is attended with tenesmus, or seems inclined to pass into dysentery, from eight to twelve leeches, in addition to the previous depletion, should be applied close to the anus, and repeated if necessary, the medicines now recommended (d) being also exhibited in a more decided manner.\* In this form of diarrhœa especially, little or no food should be allowed, excepting the

lighter farinaceous articles, as sago, arrow-root, rice-gruel, tapioca, &c. When the complaint has subsided, and the appetite become craving, or when much irritation of the lower bowels exists, chicken, veal, or mutton broth, may be taken; and the same articles, after having been strained, may also be exhibited in clysters.

29. *C. Diarrhœa from Disease of the Mucous Follicles—Mucous Diarrhœa*.—(a) Emetics have been recommended in diarrhœa by HIPPOCRATES, CELSUS (lib. iv. cap. 19.), PICHONET, FONTAINE, SYDENHAM, BANG, and VOGEL; but it is in this variety that they are most serviceable, particularly in its more recent states. In it, also, *purgatives* are required more than in any other. Ipecacuanha is the most appropriate emetic, and small doses of it will likewise be advantageously conjoined with the purgatives or other medicines prescribed. I have usually directed, if the disorder was not removed by two or three doses of the more common purgatives, equal quantities of the oleum ricini and ol. terebinthinæ to be taken on the surface of a suitable vehicle, each alternate morning; a dose of calomel or hydrarg. cum creta, sometimes with Dover's powder, having been given the preceding night, if tenesmus was not complained of; and although this practice has been pursued by me in some hundred instances in the Infirmary for Children, besides occasionally in adults and in private practice, I have never been disappointed in its effects. If, however, it does not very soon remove the disorder, we should suspect the existence of inflammatory action, and have recourse to local depletions, particularly from the anus, to warm baths, fomentations, rubefacient cataplasms or blisters on the abdomen, and a repetition of the alteratives and refrigerants already advised. After morbid or accumulated matters have been removed, and the mucous follicles excited by these medicines to a more healthy action, aromatics, cretaceous powders or mixtures, and the pulvis ipecacuanhæ compositus, or small doses of opium or the paregoric elixir, may be prescribed. Care should be taken not to exhibit astringents or opiates before morbid secretions have been discharged, nor to allow the bowels to become constipated, otherwise a chronic state of the disease or dysentery may supervene.

30. (b) The *chronic* form of this variety usually arises either from a neglected or injudiciously treated acute stage, or as a sequela of dysentery; it is also very common in children; and often occasions, as well as attends, obstructed mesenteric glands. There is no ailment, particularly when existing in children, that requires more discrimination than this. If, after an attentive enquiry into the history and previous treatment of the case, as well as into its existing state, we find the abdomen hot, the skin dry and harsh, the tongue red at its edges, or its papillæ erect, and the pulse excited but not weak, local depletions are required, and should be followed by the tepid or warm bath, or by fomentations,

dulcis 3 xj.; Spirit. Lavandul. Comp. 3j. M. Fiat Haustus, quater in die sumendus.

The purging ceased; the motions became feculent, and of a healthier colour; the severe paroxysms of pain, and the tenderness complained of in the region of the duodenum, and ducts subsided; and the catamenia became, after a few doses of the borax, copious and more natural.

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\* This form of diarrhœa is very common in persons addicted to the use of spirituous liquors; and it is, in them, frequently attended by vomiting, and severe inflammatory symptoms referrible to the duodenum, and by chronic disease of the biliary apparatus. A case of this description, in a married female of good circumstances, was seen by me, in consultation with an able practitioner, whilst this sheet was in the press. She had, in addition to the above complication, long complained of difficult and very scanty menstruation; this evacuation being watery, and of a greenish colour. She had been bled locally, and very judiciously treated. As the return of this discharge was expected, and taking into account the previous treatment, the following were prescribed; the borax chiefly on account of the scanty catamenia:—

No. 174. R. Hydrarg. cum Creta gr. iv.; Pilul. Saponis cum Opio gr. v.; Syrup. Simp. q. s. Fiant Pilulæ ij. omni nocte capiendæ.

No. 175. R. Sodæ Sub-boratis ʒj.; Aquæ Fœniculi



and by moderate doses of the purgatives last recommended. As soon as the stools are improved by these means, aromatics with opiates, or absorbents, or both (F. 623. 633.), may be prescribed; and warm clothing, with light farinaceous food, allowed. If these means be insufficient, a blister, or rubefacients, &c. applied over the abdomen, and the hydrargyrum cum creta, with the pulvis ipecacuanhæ comp. (F. 653.), and small doses of rhubarb, given night and morning, or even oftener, will be of much service. I have frequently prescribed, with the greatest benefit, in chronic cases both of this and the preceding variety, the sub-borate of soda, with honey, and the compound powder of tragacanth and capsicum.

31. (c) Chronic mucous diarrhœa, with whitish, greyish, or mucilage-like stools, arising from the absence of bile, the imperfect absorption of the chyle, and the morbid state of the mucous secretion, requires low diet, consisting entirely of farinaceous substances. At the same time, the hydrarg. cum creta ought to be exhibited twice or thrice daily, with the sub-carbonate of soda or potash, and minute doses of opium. A tonic or stomachic powder or mixture should also be prescribed, with the warm bath, and frictions of the surface upon coming out of it. If these means fail, there is probably disease of the mesenteric glands,—the liquor potassæ may be given in beef-tea, the mild mercurial continued every night, and the purgative draught already directed (§ 29.) also be tried. In some obstinate cases of this kind, I have resorted to the chlorates of the fixed alkalies or of lime, conjoined with the compound tragacanth powder, and aromatics (F. 283.), with great benefit. It will generally be necessary in this state of the disease to rouse the digestive and assimilative functions by *tonics*, and the action of the liver by mild mercurials; and to combine these remedies with antacids, or with demulcents and aromatics, or with balsams or the terebinthines. The infusions of calumba, or cascarrilla, or cinchona, or cusparia, with carbonate of ammonia, and confectio aromatica, may be first employed; and afterwards the balsams, or vegetable and mineral astringents. In more obstinate cases, the warm salt-water bath, or a tonic, stimulating, or gently rubefacient plaster to the abdomen or loins, or both, may be prescribed, and the trunk surrounded by a flannel roller; a light farinaceous diet being allowed. The treatment now described is requisite equally in *children* as in adults. This form of chronic diarrhœa is most common in the former; and when it is connected with dentition, requires constant attention to the state of the gums.

32. D. *Diarrhœa from Ulceration* requires very nearly the same treatment that was recommended for chronic mucous diarrhœa (§ 31.), of which it is generally only a modification or consequence. When the evacuations in this variety are fluid, or muddy and fœtid, and without tenesmus, the disease is most probably seated in the small intestines; and when arrested by opiates and astringents, uneasiness at the stomach, with nausea and sickness, are usually produced. Besides the means noticed in the preceding paragraph, the terebinthines and balsams may be given, with small doses of rhubarb,

magnesia, tragacanth, &c. The *mistura cretæ*, with tinct. camphoræ comp. and mucilage; the decoction of logwood, with laudanum; the hydrarg. cum creta, with pulv. ipecacuanhæ comp., and either an aromatic or an absorbent; the nitro-muriatic acid, with tinct. opii, in tonic infusions; a decoction of cusparia, with nitric acid and laudanum; the infusion of catechu, with aromatics; sulphur, with carbonate or sub-borate of soda and opium; camphor, with nitrate of potash, or chlorate of soda, and tragacanth; the chlorates, with demulcents or emollients; the nitrate of silver, with tonic extracts, &c.; the sulphates of copper, or of iron, or of zinc, or the nitrate of bismuth, either alone or with opium; lime-water; blisters and rubefacients; demulcent, emollient, and opiate clysters; tepid salt-water bathing, followed by frictions with rubefacient liniments (F. 296. 305.), and tonic plasters, with flannel rollers round the abdomen; are the means which are most to be depended upon, in this unfavourable state of the disease. Animal food generally increases the disorder, and farinaceous articles of diet should be in moderate quantity, or taken after short intervals.

33. E. *Diarrhœa with indigested Matters in the Stools*.—The treatment in this variety should be directed principally with the intention of promoting the functions of the stomach and duodenum. These may, particularly in children, and during the period of dentition, be disturbed by inflammatory irritation of the mucous surface, associated with increased action of the muscular coats (§ 12.); whenever, therefore, this condition is presumed, leeches should be applied over the epigastric region, and be followed by a sinapism, or a blister, with tissue paper interposed between it and the skin, or by a rubefacient cataplasm or liniment. As the biliary functions are usually torpid or otherwise morbid in this variety, and the mesenteric glands often diseased, hydrarg. cum creta, with sub-carbonate of potash, ought to be given at bed-time. The digestive functions will be most permanently promoted by the infusion of cinchona, or catechu, or cascarrilla, or calumba, or of cusparia and rhubarb, with liquor potassæ, or sub-carbonate of ammonia, and small doses of opium (see F. 413. 623. 788. 870.); or by chalybeate preparations, particularly the ammonia-tartrate of iron, with laudanum, or extract of syrup of poppy, or tincture or extract of hop. The use of recent ox-gall, as recommended by HORN (*Archiv.* Mar. 1810. p. 335.), or F. 481., is appropriate in this and the two preceding varieties, and will be very beneficial when it can be exhibited. In addition to these, and other internal and external remedies already noticed, the tepid or salt-water bath or semicupium, will also be productive of much advantage, particularly when followed by frictions of the abdomen or spine with stimulating embrocations or liniments.

34. iii.—(a) *Diarrhœa in the Puerperal State* (§ 14.), when it arises from accumulations of fecal matters and morbid secretions, requires the use of gentle laxatives and mild purgatives, assisted by emollient and aperient clysters, with strictly regulated diet. After the offending matters are evacuated, opiates should be exhibited. When bilious vomiting accompanies diarrhœa, or when the stools are bilious, demulcents, di-



luents, and mild laxatives are requisite, until the morbid secretions are evacuated; but if spasms with much irritability of stomach be present, opiates must be immediately exhibited, with magnesia, and nitrate of potash, which will generally remain upon the stomach; but if these be vomited, small opiate clysters or suppositories should be administered. As long, however, as the stools continue offensive, or otherwise morbid, mild laxatives, and an occasional dose of calomel or blue pill, should be prescribed. In other respects the treatment is to be conducted according to the principles already sketched. —

(b) When, in addition to the accumulation of morbid secretions, slight or chronic inflammation of the mucous surface of the bowels, with serous dark-coloured and offensive evacuations supervene, an emetic of ipecacuanha, if given sufficiently early, will be of service. After its operation, or independently of it, three or four grains of calomel, or five or six of hydrarg. cum creta, with a little magnesia, may be exhibited, and in a few hours afterwards either a dose of fresh castor oil, or any other mild purgative. If griping be present, an emollient and opiate enema should be administered. If the lochia be suppressed, the sub-borate of soda, in doses of from ten grains to a scruple, may be given three or four times daily, in emollient decoctions or infusions (F. 209. 630. 867.), or the liquor ammoniæ acetatis, with spirit. ammon. aromat. and camphor mixture, may be prescribed; mild purgatives or laxatives being repeated occasionally, until the tongue becomes clean and the stools natural. If the disease be not relieved by these means, and if pain be felt in any part of the abdomen upon well-directed pressure, or if a sense of heat or the symptoms of serous diarrhœa be present, general or local bleeding, with the rest of the treatment recommended in that variety (§ 28.), should be put in practice. Having removed morbid matters, or inflammatory irritation, where either or both exist, demulcents, absorbents, gentle restoratives, and tonic or astringent infusions, with mild diet, may be prescribed.

35. iv. In *Infants and Children*, diarrhœa assumes the bilious, serous, mucous, and lenteric characters: the former two more frequently before weaning, and in an acute form, or at a more advanced age in connection with irritation in the brain; the latter more usually after weaning, and in the chronic states (§ 16.). — (a) In slight diarrhœa, with fluid feculent motions, small doses of rhubarb with magnesia (F. 623. 633.), a grain or two of hydrarg. cum creta at night, and the tepid bath, are all that is required; care being taken that the bowels shall not become costive. If the disorder be occasioned by improper ingesta, or over-feeding, or if it be attended by fever, an ipecacuanha emetic should precede the above means, which ought to be followed by a dose of castor oil; and a grain or two of calomel ought to be given at bed-time, as advised by Dr. CLARKE (*Mem. of Irish Acad.* vol. vi.). When the stools are slimy or serous, and ejected forcibly, with tenderness on pressure, leeches and fomentations should be applied to the abdomen, and small anodyne and emollient clysters thrown up. If the evacuations emit a sour smell, and if they be greenish, or curdled, or frothy, cretaceous substances and magnesia, or ammonia, with aro-

matics, and occasionally with opium or syrup of poppies, ought to be exhibited: after the more urgent irritation is subdued, mild purgatives will still be required, and should be repeated, whenever the evacuations are morbid. Great caution is necessary in exhibiting opiates to infants, either by the mouth, or in clysters, and they ought not to be given when the symptoms indicate the retention of morbid matters in the bowels. In order to evacuate these matters, the following may be prescribed: —

No. 176. R. Spirit. Ammon. Aromat. ʒjss.; Olei Ricini, Syrup. Rosæ, et Mannæ Opt., āā ʒss.; Aquæ Pimentæ et Aq. Com. āā ʒj. Fiat Emulsio, de quâ sumatur Coch. unum minimum vel mediocre, pro re natâ. Vel,

No. 177. R. Potassæ Tartar. ʒij.; Infus. Sennæ Comp. et Aq. Fœniculi Dul. āā ʒj.; Syrup. Sennæ ʒss.; Olei Anisi ʒvj. Fiat Mist., ejus capiat Coch. unum mediocre vel amplum pro dosi.

No. 178. R. Hydrarg. cum Creta gr. xij.; Sodæ Sub-carbon. exsic. ʒss.; Camphoræ rasæ gr. iij.; Pulv. Ipecacuanhæ, Pulv. Opii, āā gr. j.; Pulv. Cinnamom. gr. xviii.; Sacchari Albi ʒj.; Olei Anisi ʒiv. Tere probe simul, et divide in Cartulas xij., quarum omni nocte, vel mane nocteque, capiatur una.

36. When the diarrhœa proceeds *from weaning*, either prematurely or at the proper time, the treatment now advised, or that recommended for the *mucous* variety (§ 30, 31.), should be employed. Dr. CHEYNE directs small and repeated doses of calomel; but, unless morbid matters are accumulated in the *prima via*, — when it should be given in a full dose, and be followed either by castor oil, or the mild purgatives already prescribed, — the hydrarg. cum creta, with magnesia and Dover's powder, or F. 923., is preferable. When the stools are slimy or bloody, or squirted out forcibly, leeches should be applied to the abdomen, and these medicines be also given in small but frequent doses; fomentations, demulcent clysters containing olive and castor oil, the tepid bath, and warm clothing, being also prescribed. If it assume the *acute* character, or at the commencement of the attack, the treatment prescribed in the article on the CHOLERIC FEVER OF INFANTS (§ 11. 15.), of which it is merely a modification, is in every respect appropriate. When it passes into the *chronic* form, the means recommended with reference to chronic mucous diarrhœa, or the ammonia-tartrite of iron, with confectio-aromatica and compound tragacanth powder, should be employed; the hydrarg. cum creta and Dover's powder being exhibited every night. The abdomen or spine ought also to be rubbed night and morning with either of the liniments (F. 296. 300. 311.), upon coming out of the tepid or warm bath, and be rolled in flannel. When the patient's strength is not much reduced, and if there be fever, and offensive evacuations, much benefit will result from a dose of calomel, with a grain of James's powder, at bed-time, and from one to two drachms of castor oil, with half a drachm of the spirits of turpentine, taken on the surface of fennel water the following morning. Clysters of beef-tea, or of strained mutton or veal broth, well salted, may also be thrown up; and the chlorates of the alkalis or of lime, or lime water; the sulphate of iron in small doses, with the sulphate of potash; the liquor potassæ, or the sub-carbon. of ammonia, with infusion of cinchona, or of catechu, or F. 183. 536. 363. &c., may be prescribed. With a light nutritious (chiefly farinaceous) diet, a sufficient quan-



tity of salt should be taken; and if the vital powers be much depressed, warm spiced port wine negus may be allowed in small quantities. In the variety attended by copious, pale, albuminous urine, &c. (§ 17.), strong jellies and soups, animal food, fresh eggs very lightly boiled, the chlorates, with small doses of rhubarb, vegetable and mineral tonics and astringents, the preparations of iron, warm salt-water baths, and frictions with stimulating liniments, are the most beneficial. If the bowels become constipated, the mildest laxatives should be prescribed. If the urine be much diminished in the more common form of the disease after weaning, the spirit. ætheris nitrici ought to be given; and if drowsiness or *coma* supervene, blisters may be applied behind the ears. These last symptoms are more frequently the consequence of exhaustion than of effusion, when they occur late in the disease: or if effusion take place, it is the result rather of the physical state of the brain, a serous fluid poured out from the vessels filling the vacuum that would otherwise have been left by the anæmic and atrophied encephalon, and requires tonic and restorative remedies. In such cases, more advantage will accrue from measures calculated to support the vital powers, to allay irritation in the *prima via*, and to determine the circulation to the external surface, than from those which depress the energies of life, although they may act beneficially in other respects. It is necessary to watch carefully the state of the gums throughout this serious and obstinate form of diarrhœa, and to lance them whenever they indicate the propriety of the operation.—(d) If the diarrhœa, either in infants or older children, be symptomatic of *cerebral congestion, irritation, or inflammation* (§ 35.), leeches behind the ears, calomel with James's powder, the semicupium, cold affusions on, and cold applications to, the head, with cooling diaphoretics, diuretics, and external derivatives, are the chief remedies.

37. v. *Diarrhœa in the Dark Races* requires a much more general and liberal use of aromatics, absorbents, and warm astringents, than are admissible in the white variety of our species. In them, capsicum and the other hot spices, with cretaceous powders and mixtures, the preparations of catechu, of kino, of iron, &c., are almost indispensable. When symptoms of retained fæcal matters are present, purgatives are requisite, but they should be of a warm and tonic kind, or be combined with substances of this description. Although diarrhœa is only occasionally complicated with *intestinal worms* in Europeans, and then chiefly in children, or in the inhabitants of low, moist, warm, imperfectly ventilated and unhealthy places, it is very often thus associated in the dark races, and at every age. This circumstance, therefore, should suggest the employment of anthelmintics, especially those which are tonic and astringent, as the decoction of the pomegranate root, or the pink-root, or the male fern, in preference to other medicines, particularly when these parasites are suspected to be present. In this class of subjects, whether diarrhœa be thus associated, or simple, a sufficient quantity of salt with aromatics should be allowed, and the patient's strength be kept up by suitable nourishment, and by vegetable and mineral tonics.

38. vi. *The Associations of diarrhœa* (§ 19.) require the greatest discrimination.—(a) When it accompanies the *invasion of fevers*, it generally proceeds from the irritation of retained excretions and acrid secretions in the *prima via*. These should be evacuated by an ipecacuanha emetic, and by diluents and demulcents, followed by a full dose of calomel, and this latter by a mild purgative and oleaginous enema. If signs of vital depression exist, warm diaphoretics with ammonia, and occasional doses of rhubarb with magnesia, and the warm bath, should be afterwards prescribed; but if febrile excitement accompany the diarrhœa, saline refrigerants, and the rest of the treatment recommended in the *serous* variety, will be necessary. (See *FEVERS*.)—(b) When the disorder accompanies *gout*, or occurs in the *gouty habit*, it should not be checked. Mild purgatives may be first prescribed in conjunction with preparations of ammonia, or one of the fixed alkalies; and when morbid secretions and fæcal matters are evacuated, full doses of magnesia, or of potash or soda with the spirit. colchici ammoniatus, and afterwards mild tonics, will generally restore the digestive functions.—(c) When diarrhœa is complicated with *bronchitis* (§ 19.), as often occurs during dentition, local depletions, lancing the gums, and calomel or hydrarg. cum creta, followed by a mild purgative, and these by diaphoretics, demulcents, emollients, the tepid or warm bath or semicupium, and attention to diet and warm clothing, are the means to be chiefly depended upon. In many of such cases, ipecacuanha emetics, and in others, camphorated refrigerants, will be productive of great benefit: the former when the bronchi are much loaded, and the stools are mucous and offensive; the latter when there is much heat of skin, and serous or watery evacuations.—(d) Diarrhœa complicated with *scarlatina, measles, or small-pox*, must be treated with strict reference to the state of vital power, the appearance of the eruption, and the character of the evacuations. These important complications are particularly noticed in the articles on these diseases; but I may here remark, that a sudden arrest of the evacuations may be followed by effusion within the head, and *coma*, whilst their unrestrained continuance may occasion exhaustion, or fatal disorganisation of the intestinal mucous coat. The treatment should therefore be directed, in such cases, with the intentions of diminishing inflammatory action in this part by moderate local depletions, of equalising the circulation and secretions by external derivatives and relaxants, and by diaphoretics and diuretics, and of supporting the powers of life, whenever they become depressed, by diffusible and permanent stimulants. I may state as the result of experience, that, when this complication follows an imperfect developement, or retrocession, of the cutaneous eruption, even moderate depletions are not well borne, unless they be accompanied by warm diaphoretics and diffusible stimulants; and that, of the latter medicines (which are very generally appropriate), full doses of ammonia, or of camphor, or of both, in some instances combined with nitrate of potash, in others with alkaline carbonates or magnesia, in most with demulcents and emollient diluents, in several with laxatives, and in many



with aromatics, or tonics and antiseptics, have proved the most beneficial.—(e) When a diarrhœa that is not critical *accompanies or follows remittent, continued, or adynamic fevers*, the evacuations being watery, muddy, dark-coloured, or otherwise morbid, the hydrarg. cum creta, with ipecacuanha, camphor, and cretaceous substances; or the terebinthines and the balsams, with vegetable or mineral astringents; also tonics and antiseptics, the nitric and muriatic acids, or both; or rhubarb with magnesia; the chlorates with demulcents; external derivatives with warm rubefacient and stimulating liniments, &c., are the chief remedies, and the most likely to prevent the extensive sloughy ulcerations that sometimes attend the diarrhœa that supervenes either during, or subsequently to, these diseases.

39. *Colliquative diarrhœa* is sometimes not easily controlled; and even when most readily repressed, the constitutional disturbance may be thereby increased. It is most benefited by small doses of the sulphates of copper and of zinc (F. 577. 587.), by the mineral astringents generally, and by the cretaceous and demulcent preparations, combined with camphor, aromatics, and opiates, or with tonic and astringent infusions and decoctions, which, at the same time that they alleviate the symptoms, also support the vital energies. But the adoption and combination of these, or the choice of other remedies already or about to be noticed, should depend mainly upon the nature of the primary disease, of which the diarrhœa is, in this state, merely an advanced symptom.

40. *Cautions, &c.*—The *critical* manifestation of diarrhœa should never be interfered with, unless it either proceed so far as to depress the vital energies, or be attended by signs of inflammatory disease of the mucous surface and follicles, in which case the treatment recommended for the varieties indicative of such disease and its consequences should be prescribed. When diarrhœa occurs in gouty or asthmatic persons, or in those of a plethoric habit of body, or who have a tendency to, or have suffered from, cerebral affections, or hepatic disorders; or in the leucophlegmatic and hydropic diathesis; it ought to be treated with much caution; and should be only at first moderated, if very severe, by mild purgatives or laxatives; by depletions, diaphoretics, and diuretics; by a regulated diet; and by warm clothing, according to the circumstances of the case, because the sudden arrest of the evacuations by opiates and astringents may be attended by some risk.

41. vii. NOTICES OF PARTICULAR REMEDIES RECOMMENDED BY AUTHORS, &c.—*A. Bleeding* has been advised by COTUGNUS (*De Venæsect. in Diarrh.* Rom. 1604.); by HORSTIUS (*Opp.* iii. p. 68.); by ZACUTUS LUSITANUS (*Med. Pr. Hist.* l. ii. p. 734.); in the bilious variety, and by SYDENHAM. It is obviously requisite in the inflammatory states of the disease, whether acute or chronic, and preferably by leeches applied to the abdomen, to the sacrum, or to the verge of the anus, particularly when tenesmus is present.

42. *B. Refrigerants* are always beneficial in the serous and mucous varieties, and when the complaint is attended by increased heat or excited circulation, and erect papillæ of the tongue; and they may be combined with demulcents and opiates

(F. 36. 821. 838. 886.) according to the circumstances of the case. Of this class of medicines the *nitrate of potash* or of *soda*, *camphor* (F. 431.), the *muriate of ammonia* (F. 352. 431.), *borax* (F. 209. 630. 867.), variously combined, and the *tepid bath*, are the most appropriate. RECAMIER (*Annuaire Méd. Chirurg.* vol. i. p. 113.) recommends nitre with the *oxyde of bismuth*, and opiated aromatics. HUFELAND prefers the *muriate of ammonia* (STARCK, *Archiv.* b. i. st. 3. p. 93.) in the inflammatory states, and when it accompanies fevers; and ZADIG combines it with mucilaginous substances (*Journ. der Erfind.* st. xxi. p. 57.).

43. *C. Laxatives and mild purgatives* have already been sufficiently noticed. Those of an irritating nature are not unfrequent causes of the complaint, and ought never to be prescribed. Even castor, olive, or almond oil, if they be in the least acrid or rancid, will be productive of much mischief. I have seen enteritis supervene on diarrhœa from this cause. In the chronic states of the disease, *sulphur*, with cream of tartar and sub-borate of soda, in the form of electuary (F. 790.), and conjoined with aromatics, is often the best laxative that can be employed. It has been preferred by LANGE (*Miscell. Verit.* p. 29.), and it possesses the advantage of relaxing the skin.

44. *D. Diaphoretics* are of much benefit in all the febrile states of the disorder, particularly the serous variety, and are advantageously combined with refrigerants. They have been adopted by SYDENHAM, DIEMERBROECK (*Observat. et Curat.* No. 64.), LENTIN (*Beyträge*, b. iv. p. 332.), OSIANDER (*Denkwürdigkeiten*, b. ii. p. 179.), &c. The chief of this class are James's powder, ipecacuanha, camphor, carbonate and acetate of ammonia, spiritus ætheris nitrici (F. 394. 840.), &c. *Ipecacuanha*, particularly when associated with nitrate of potash, camphor, and opium, is one of the most certain and efficient remedies we can prescribe in all the acute forms of the disease; and it is also a very useful adjuvant of other medicines (see F. 39. 495. 642. 744. 924.). It has been very generally used, and particularly by LINNÆUS (*Amæn. Acad. Upsal.* vol. viii. p. 246.), FOTHERGILL (*Med. Observat. and Inquir.* vol. vi. art. 18.), BALDINGER (*N. Magazin.* b. xix. p. 404.), STARK, LOEFFLER (*Beyträge*, b. i.), and BROUSSAIS (*Loc. cit. in Bibli.*), either in the combinations now noticed, or in those constituting the old and new Dover's powder. It may also be given with the nitrate of soda, and opium; or with the *tormentil*, as formerly directed by me (*Lond. Med. Repos.* vol. xviii. p. 329.).

45. *E. Demulcents and emollients* are of service in all the varieties of diarrhœa: those of an oleaginous kind, in the form of an *emulsion*, when a laxative is required, as the castor, olive, or almond oil, with ammonia, or the fixed alkalies, &c.; and those of a mucilaginous description, when a constipating effect is desired, as the compound powder of tragacanth (F. 389.), or mucilage of acacia, and decoction of Iceland moss (LIND. HERBER, in HORN, *Archiv.* Nov. 1810, p. 289.); and they may be combined with refrigerants, or opiates, aromatics, absorbents, or astringents,—also with *sedatives*, as the hydrocyanic acid, the preparations of morphine, or of hyoscyamus, or of hop, or those of ipecacuanha, according to circumstances. (See the EMULSIONS, in the Appendix.) They are often of great ser-



vice when administered in the form of small *clysters*, conjoined with opium, as advised by SYDENHAM (*Opp.* p. 87.), HILDENBRAND (HUFELAND, *Journ. der Pr. Heilk.* b. xiii. st. 1. p. 148.), and HUFELAND (in *Ibid.* b. xxvi. st. 3. p. 155.)

46. *F. Absorbents* are especially indicated when the complaint is connected with acidity in the *prima via*; and the cretaceous, magnesian, and ammoniacal substances, combined with opiates, aromatics and astringents (F. 37. 347. 354. 384. 442. 648.), are the most serviceable when relaxation of the mucous surface and debility exist; and the sub-carbonates of the fixed alkalies, associated with refrigerants (F. 838.), when inflammatory action is present in this surface.

47. *G. Aromatics* (F. 348. 363.) are particularly requisite in asthenic cases, and if the patient has been in the habit of using hot condiments and spices with his meals; or when the diarrhœa arises from unwholesome water, from stale animal food, and from endemic causes; in which circumstances, *charcoal*, in large doses, as recommended by Dr. JACKSON, and some American physicians, may also be given. Aromatics are best combined with absorbents and vegetable tonics or astringents.

48. *H. Tonics*, particularly *calumba* (F. 51. 869.), *casarilla* (F. 870.), and *cinchona* (F. 380, 381.), are often requisite, especially in conjunction with the alkaline and other absorbents, and with aromatics, opiates, &c.; and in the idiopathic, the asthenic, and chronic states of the disease. In such cases, and thus combined, *calumba* has been recommended by PERCIVAL (*Essays*, vol. ii. p. 3.), STARK (*Klin. und Anat. Bemerk.* p. 7.), THOMANN (*Annalen.* ad 1800, &c.), FRANK (*Acta Inst. Clin. Viln. Ann.* ii. p. 79.), FISCHER (in HUFELAND, *Journ. d. Pr. Heilk.* b. xvi. st. i. p. 123.), and LICHTENSTEIN (*Ibid.* b. xix. st. i. p. 180.); *quassia*, by LETTSOM (*Mem. of Med. Soc. of Lond.* vol. i. p. .); *casarilla*, by BANG (*Act. Reg. Soc. Med. Havn.* vol. i. p. 241.) and others; the *willow bark* (F. 414.), by WHITE (*On the Broad-leaved Willow Bark.* Bath, 1798.); and the *cinchona* with opium, by PICQUE (*Journ. de Méd.* t. xlii. p. 433.) and SCHMIDT (HORN, *Archiv.* b. v. p. 236.), chiefly when the complaint assumes a periodic form, or is connected with remittents or intermittents. *Nux vomica* and *strychnine* have also been prescribed in atonic diarrhœa: the extract of the former, by THEUSSINK, OSWALD (*Archiv. der Pr. Heilk. f. Schlesien*, b. ii. st. 4. art. i.), HORN (*Archiv.* Nov. 1810, p. 258.), and RUMMEL; the latter, by RECAMIER and GRAVES (see *Bibl.*), who gave the twelfth part of a grain of it twice or thrice a day, with complete success, in an obstinate case of white mucous diarrhœa. Dr. RUMMEL considers it particularly efficient in removing this very obstinate form of the complaint, when seated in the lower bowels.

49. *I. Astringents* are requisite in similar states of combination as tonics, and in the same forms of the disease. They are not admissible in the bilious variety, or where fæcal collections or acrid matters are retained, or in the inflammatory states of the complaint, until after depletions, refrigerants, and diaphoretics have been employed; but they are seldom of use whilst the temperature of the surface is increased, and the

pulse accelerated, although M. BALLY's experiments indicate the contrary.—*a.* Of the *vegetable substances* belonging to this class, the most serviceable are catechu, kino, the *pomegranate bark* or *root*, the *cusparia* or *angustura bark*, *logwood*, &c., and some mineral substances. The preparations of *catechu* with those of chalk and opiate confection, or F. 30. 183. 788., are very generally employed, as well as those of *kino* (F. 34. 536.). Some doubts exist as to whether catechu or kino is most serviceable. Dr. PEMBERTON preferred the latter; and M. BALLY (*Gazette de Santé*, &c. 1829, and *Med. Gaz.* vol. v. p. 700.) found, from an extensive trial of it, that it generally arrested chronic diarrhœa, without fever, in four or five days, when taken to the extent of from twelve to twenty grains daily; and that, even in diarrhœa with fever, and tenderness of the abdomen on pressure, it was equally successful. The bark of the root of the *pomegranate*, as well as its flowers, and the exterior of the fruit, have been long employed in diarrhœa in Eastern countries. They were much prescribed by MEAD, STRANDBERG, and CULLEN. MEAD gave them in the form of decoction with cinnamon and red roses. They are very beneficial when the diarrhœa is complicated with worms. The *cusparia* or *angustura bark* was much praised by LETTSOM (*Mem. of Med. Soc. of Lond.* vol. vi. art. 15.) and THEUSSINK; and is an excellent medicine, either in substance, tincture, or infusion (see F. 201. 413.). The *krameria*, or *rhatany root*, first employed in diarrhœa by the Spanish physicians, Dr. RUIZ (*Mém. de l'Acad. Roy. de Madrid*, 1796, p. 364.) and Dr. HURTADO (*Journ. de Méd.* &c. t. xxxvii. p. 216.), has since been used with advantage in this country (F. 734.). The *simarouba bark* was recommended by JUSSIEU, CAPET, FRIZE (*Annalen*, i. p. 59.), and WERLHOF (*Observat. de Febr.* sect. iii. § 6.), but chiefly in the diarrhœa attendant on fevers; and the *mahogany bark*, by HUGHES (*Med. Facts and Observ.* vol. vi. art. 10.). These may be prescribed in the form of infusion with the *arnica*, the root of which has been much used by THEUSSINK in this complaint. The *logwood* is an excellent astringent, and, in the form of decoction, a suitable vehicle for other remedies. The *bistort*, the *uva ursi* (F. 217. 396.), and *tormentil*, are also of much service, particularly when associated with *ipeacuanha*. The root of *comfrey*, the *consolida major*, is recommended by HUFELAND (*Journ. der Pr. Heilk.* 1809.); and the *lythrum salicaria*, by BLOM, BANG (*Op. cit.*), DE HAEN (*Rat. Med.* par. iii. par. 195., p. iv. p. 250.), and HERZ (*Briefe*, st. i. art. i.). They are much employed in the north of Europe.

50. *b.* The *mineral astringents* are very beneficial in several of the forms of diarrhœa, particularly the chronic. *Lime* in various forms,—in cretaceous powders and mixtures, chiefly as absorbents; and in the state of *chlorate* (F. 283.), or recent *lime water*, as powerful astringents,—are very serviceable, especially when associated with demulcents, mucilages and aromatics. I have used the chlorate of lime on many occasions with advantage; and *lime water*, with boiled milk, or with the other medicines just referred to, is in very general use. *Alum*, also, variously combined, or in the form of *alum whey*, has been



praised by ADAIR (*Edin. Med. Comment.* vol. ix. p. 21.) and HARRISON (*New Lond. Med. Journ.* vol. ii.). It may likewise be given with other astringents, or with aromatics and opiates. The *superacetate of lead* was prescribed by Dr. ARCHER (*N. Y. Med. Repos.* vol. iii. No. 3.), with opium; but HORN (*Archiv. b. vi. p. 144.*) states that he found it of no use. I have seen benefit derived from it in the diarrhœa attending the advanced stages of phthisis. The *sulphate of copper* has been tried successfully by Dr. ELLIOTSON, in doses of from half a grain to two grains, given twice or thrice a day, with opium; and the *ammoniated copper* has been prescribed by BIANCHI (*BRERA, Comment. Medici. Dec. i. vol. ii. art. 2.*). The *sulphate and oxide of zinc* are also useful, especially when combined with rhubarb, or myrrh, or the balsams, or terebinthines (F. 578. 587. 666. 875.). The *nitrate of silver*, triturated with a tonic or astringent extract, and in small doses, has been employed by me on various occasions with advantage, particularly in the mucous variety, and in very chronic cases. The mineral astringents are often the most efficacious in colliquative diarrhœa.

51. *K.* Besides the above, there are *other remedies* which may be noticed. These are, the *tussilago* (PERCIVAL, *Essays*, vol. ii. p. 224., and FRIBORG, in *Todes Biblioth. b. i. p. 118.*); large doses of *almond oil*, as an emollient and laxative (VALLISNERI, *Opp.* iii. p. 278.); the infusion of the *diosma crenata* (F. 231. 396.); the *plantain* in demulcent broths; unripe *medlars* (FORESTUS, *Opp.* vol. iii. p. 47.); the root of the *geum urbanum* (DE MEZA, in *Acta Reg. Soc. Med. Haun.* vol. ii. No. 4. p. 28., and RANÔÉ, in *Ibid.* vol. iii. p. 369.); the *Peruvian, Canadian*, and other balsams (F. 369.); the *briony* (ARNAUD, in *Journ. de Méd. t. lxxvi. p. 257.*); the *decoction of elm-bark* (COLLINGWOOD, in *Edin. Med. Comment.* vol. xvi. p. 58.); and *camphor* (THOMANN, *Annalen ad 1800*, p. 355.); which latter I have already recommended, from a frequent experience of its good effects when judiciously prescribed. *Sarsaparilla* will also be found useful in chronic states of the complaint, and may be associated with the decoctions of elm-bark or of Iceland moss, or with lime water or liquor potassæ; small doses of hydrarg. cum creta, with Dover's powder, being exhibited at bed-time. BANG advises *salivation* in obstinate cases; and in rare instances it may be advisable to resort to it. Dr. A. STOUT (*Phil. Med. Journ.* May, 1823.) states that he cured a case of diarrhœa from suspended menstruation by the *ergot of rye*, given in doses of six grains three times a day.

52. *L.* The administration of most of the medicines noticed in the course of this article, in the form of *clyster*, will prove of much benefit, whenever signs of disorder in the course of the colon can be traced, or when the complaint has been preceded by dysentery. In these, HORN (*Archiv. b. vi. p. 139.*) advises the infusion of valerian to be administered in this way. An infusion of *ipecacuanha* may likewise be thus prescribed. When the diarrhœa assumes a chronic form, *warm or tepid salt-water bathing*, or *artificial irritations and eruptions* induced on the abdomen, and kept up for some time, will be generally serviceable. When this practice can-

not be adopted, either warm, tonic, and deobstruent plasters should be placed on the abdomen or loins, or a flannel belt or roller be worn around the lower part of the trunk. I have found a large plaster consisting of equal proportions of the emplast. picis comp., the emplast. ammoniaci cum hydrargyro, and the emplast. galban. comp., extremely useful, particularly when the complaint has been connected with hepatic disease. These means, in the most severe and obstinate cases, will be much promoted by slow and frequent or constant travelling, or sea voyaging.

53. *M.* The diet should be strictly regulated, not only in the course of the disease, but also during convalescence, and after recovery. Whilst the complaint continues, especially in the acute form, the food ought to be farinaceous, very mild, and in small quantity. In the chronic states, also, this injunction should be followed in many cases; the lighter kinds only of animal food, in small quantity, being allowed when the patient's strength requires it. Malt liquors, acid wines, and acid or over-ripe fruit, or pastry, particularly its crust, ought to be entirely relinquished. Good or old port wine, however, or old sherry, will frequently agree with the patient, and is often even requisite. In cases requiring astringents and tonics, not only may wine be allowed, but also a substantial, but light, diet of well-seasoned and simply dressed animal food. The diet, during convalescence and recovery, ought never to be continued on so restricted a scale as to lower the patient's vital energies, without making trial of the effects of that which is more nutritious.

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#### DIGESTIVE CANAL—ITS LESIONS.—SYN.

*Digestive Tube, Alimentary Canal, Prima Via, Gastro-intestinal Canal or Tube. Canal Gastro-intestinal, Fr.*

CLASSIF.—GENERAL PATHOLOGY; Morbid Structures.

1. The several morbid changes to which the digestive canal below the diaphragm is subject, will be noticed here, in a general and connected manner, its principal diseases being described individually in separate articles. The changes experienced by that part of the tube which is placed above the diaphragm, are detailed in the articles FAUCES, ŒSOPHAGUS, and PHARYNX.

2. Of certain appearances in the digestive tube, that cannot be imputed to disease of any part of it, but which have often been mistaken for disease.—The internal surface of the stomach or intestines of a living animal, whose circulation is not disturbed, is of a red tint, somewhat deeper than that of the mucous membrane of the cheek of a healthy person. During the period of digestion the tint is much deeper, evidently owing to increased flux of blood; and its secretions and exhalations are much increased. The red tint of health, however, disappears after death; and the digestive surface generally becomes uniformly pale, or slightly rose-coloured in places, at the period when *post mortem* examinations are usually performed. There are, however, certain circumstances which modify its appearances upon dissection, totally independent of disease of any part of the digestive canal. Some of these circumstances have operated shortly before death; others during the last moments only; and several either soon, or a considerable time, after the extinction of life.

3. (a) The causes which operate before death, are, 1st. The performance of the digestive processes, the increased redness of the villous surface attending them generally continuing after the cessation of life. 2d. The free return of the venous blood from the gastro-intestinal tube, to the right cavities of the heart, causing, in the first degree, simple congestion of the venous trunks; in a higher degree, along or continuous with this congestion, an injection of the small vessels in streaks, stripes, patches, or points, with opacity of the injected parts; and, in the highest degree, a partial effusion of blood into the sub-mucous cellular tissue, forming ecchymoses, or into the cavity of the part, colouring red the matters contained therein. It is evident, not only that the disease of remote or related organs will thus affect the colour and state of injection of the vessels of the digestive tube, according as it may impede or facilitate the return of blood from them but that the kind, the mode, and

phenomena of dissolution will have the same effect. Thus, death by asphyxia generally presents a congested and deep-coloured tint of the digestive mucous surface. These facts, which seem to have been not unknown to MORGAGNI, to have been proved by experiment by BOERHAAVE, to have been observed in the cases of strangulation examined by Dr. YELLOLY, and to have been demonstrated in cases of asphyxia, and by experiment, by the French pathologists, especially BILLARD, ANDRAL, &c., are most important, and evidently indicate that disease has been incorrectly imputed to the digestive canal, when the appearances whence the inferences were drawn, arose either from lesions of other organs, or from the mode in which death was produced.

4. (b) The causes of redness and injection of the digestive mucous surface operating after death, are, 1st. The gravitation of the blood; and, 2d. Its transudation through the parietes of the vessels. The first of these begin to act immediately after death, and whilst the blood is still fluid, as shown by the researches and experiments of MM. TROUSSEAU and RIGOT. The injection and redness of the intestinal parietes produced by gravitation, or injection from *hypostasis*, generally acquires its highest degree at the end of some hours from the extinction of life, and ceases to increase as soon as the fallen temperature of the internal parts allows the blood to coagulate. Hence, the longer the blood continues fluid, and the more abundant it is in the vessels of the digestive canal, the more marked will be the injection of depending parts from hypostasis. The second of these *post mortem* causes of redness takes place at a remoter period—usually after twenty-four hours in summer, and after thirty-six or forty hours in winter; but the period varies with the nature of the disease, and the state of the blood at the time of dissolution. This change commences first with red spots in the course of the vessels, isolated, grouped together, or running into one another, giving rise to coloured streaks, and evidently proceeds from the exudation of the blood through the vessels containing it. At a later period, the redness is not limited to the course and situation of vessels; but the whole surface becomes more and more uniformly tinged, until it is equally red, approaching the appearance existing in the internal surface of the blood-vessels under similar circumstances. The following is a summary of the causes modifying the appearance of the gastro-intestinal canal; and which, in some respects, and with some additions, is the same as given by M. ANDRAL.

5. The digestive mucous membrane is seldom of the same colour in the healthy state. It may be—(a) perfectly white or whitish, although this state does not imply that functional disorder did not exist during life.—(b) It may present various tints or degrees of colour, without ceasing to be sound, depending, 1. on the performance of the digestive processes, shortly before or at the time of death; 2. on the congestion to which internal vascular parts are liable at the last agony or moments of life; 3. on mechanical obstacles to the return of blood in the veins existing a longer or shorter period before dissolution; 4. on the gravitation of the blood to depending parts; 5. on the exudation of blood through the parietes of the vessels; 6. on the exudation of this fluid



through the capsule of the spleen; 7. on the gases existing in the canal at the time of death; 8. on the developement of other gases at a remoter period, when putrefaction commences; 9. on the combination of the colouring matter of the bile present in the digestive tube, with parts of its mucous surface; and, 10. on the medicinal or other ingesta, which may change its colour so as to resemble the morbid state. Some of the colours produced by these causes cannot be confounded with that resulting from inflammation; others very nearly resemble it, especially those occasioned by the 1. 2. and 4. and certain varieties of 3. and 5. Those states of the digestive surface that most nearly resemble inflammation, may in respect of it be denominated *passive*. M. BILLARD has given the following *diagnosis* between *passive* and active or *inflammatory* redness of the villous or digestive mucous coat. —

*Inflammatory.**Passive.*

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| <p>a. With or without manifest thickening of the membrane.</p> <p>b. Indifferently in a depending or elevated part.</p> <p>c. Without general injection of the abdominal vessels, and without any obstacle to the course of the blood; sometimes consisting in only a slight local injection.</p> <p>d. With considerable tenderness of the sub-mucous tissue, and a capability of raising the mucous coat in large patches.</p> <p>e. With thickening and abundance of the intestinal mucus; and sometimes with sanguineous exhalation.</p> | <p>a. The same.</p> <p>b. Almost always in a depending part.</p> <p>c. With general injection of the abdominal vessels, and with an obstacle to the course of the blood; rarely being an isolated local injection, but frequently occupying a fold of the intestine, or the whole intestine.</p> <p>d. A power of raising the mucous membrane in shreds only, which is the case in health.</p> <p>e. Without abundance or thickening of the intestinal mucus; but sometimes with sanguineous exudation.</p> |
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6. This diagnosis refers merely to the differences between *redness* from inflammatory irritation and redness from passive congestion. The various *results* of inflammation of the mucous membrane are entirely left out of the question. This tissue seldom experiences any change in *density* within the period which usually elapses between death and the examination. Therefore, *softening* can very seldom be justly considered a *post mortem* change. In respect, however, of the stomach, the case has been supposed to be otherwise, and upon good grounds. The observations of J. HUNTER and ALLAN BURNS on the human subject; of CARLISLE, COOPER, and WILSON PHILIP, on rabbits; of ADAMS, BRETONNEAU, and TROUSSEAU, on dogs; and of SPALLANZANI on fishes; show that the solvent action of the juices of the stomach may be exerted upon itself, within twenty-four hours from death, so as not only to soften its villous coat, but to dissolve both it and the coats exterior to it, until the organ is perforated or destroyed in one or more places. The possibility of this occurrence is shown by the experiments of STEVENS, LOVELL, and others, demonstrating the solvent power of these juices; and that it actually takes place, is established by the experiments of Drs. CAMERER and CARSWELL, as well as by the sound health of the subjects of it at the time of death, and the absence of inflammatory appearances around the destroyed part, or in the peritoneal coat. The healthy state of the other tissues composing the parietes of the digestive canal, and the natural

capacity and position of its different parts, require no remark.

7. I. FUNCTIONAL DISORDERS.—The disposition, which has prevailed for many years, and which is still so manifest in medical literature and practice, to impute every morbid condition to inflammatory action, and changes of structure, has been displayed more in this branch of pathology than in any other. Since the appearance of the writings of MARCUS, and especially since the promulgation of the doctrine of BROUSSAIS, all the states of disorder referrible, directly or sympathetically, to the digestive organs, have been considered by many to arise from inflammatory irritation and action, or their consequences, in various grades or states of activity; and even those who have not adopted the views of this very zealous writer, have too generally overlooked the primary and controlling influence of the vital endowment in the origin and removal, not only of the diseases of the alimentary canal, but of its related viscera, and, indeed, of those of all other organs. The pathologist who observes closely the action of the numerous agents which either merely change the conditions of life, as manifested in the sensitive and contractile systems, or which produce alterations of structure cognisable by the senses, and who notes the manner in which primary impressions affect related and even remote parts, must have often remarked, that some connection subsists between the nature of the agent, the particular system acted upon, and the effect produced; that the more obvious and palpable lesions are generally remote and often only contingent results; and that alterations apparently identical are often associated with, even when they are not the consequences of, very different states of sensibility and contractility, as well as of the other manifestations of vital power. It is necessary to our enquiries into the morbid states of a part, which, with reference to the formative and vegetative processes especially, is primarily and essentially vital, and which, from its intimate connection with the organic system of nerves, powerfully influences, whilst it is itself influenced by, the vital endowment or appropriate influence of this system,—of a part especially devoted to the preparation of the materials for the reparation of the structures, and the support and perpetuation of life,—to view its changes of function and of structure accordingly, and with strict reference to the foregoing considerations.

8. i. *Changes in the Desire for Food and Drink.*—If the alimentary canal be admitted to be, of all parts of the economy, that in which identity of lesion the least infers identity of symptoms, the same admission should be extended to the causes whence its lesions arise. *Morbid states of hunger and thirst* have, with other disorders of the digestive tube, been imputed either to inflammatory irritation or action, or to organic changes. That they proceed, in many cases, from those lesions, must be admitted; but that they uniformly or necessarily thus originate, cannot be maintained.—(a) *Anorexia*, or loss of appetite, although a very general attendant on all the organic changes observed in the stomach, is not uniformly present; for circumscribed lesions have been sometimes found in this viscus, without this symptom having been observed. And, on the other hand, it often exists entirely uncon-



nected with any change of texture. Both M. LOUIS and M. ANDRAL have found, in persons who had long evinced the greatest aversion from every kind of food, the stomach perfectly sound. Anorexia appears frequently, independently of the evidence of *post mortem* research, to depend upon a change in the state of the nervous power, as shown by the influence of moral emotions, and mental and physical fatigue in producing it. Its occurrence as a symptom of all acute or serious diseases of related, as well as of remote organs, and of idiopathic and exanthematous fevers, is well known.—(b) The frequent connection of *bulimia* with irritation and organic diseases of the stomach, and even of the bowels, is admitted; but it is also dependent upon a temporary activity in the nutritive processes, as in convalescence from acute diseases; and is then referrible to the condition of vital endowment, as manifested in the digestive and reparative functions.—(c) *Pica*, whilst it also often arises from chronic irritation of the stomach, is as frequently a symptom of disorder in the organic nervous system, and even of a morbid state of the blood, and it sometimes depends upon functional or organic change in some remote organ, as the uterus or ovaria. (See APPETITE, MORBID; and CHLOROSIS.)—(d) *Thirst* has also been imputed to irritation or inflammatory action; but, although it is certainly a symptom of this and other diseases of the stomach, and the rest of the digestive tube, it likewise arises from diminished exhalation and secretion in the pharynx and fauces; from the rapid discharge of the aqueous parts of the blood by the surfaces or kidneys; and from the superabundance of saline particles in the serum.

9. ii. *Disorders of the Functions of Chymification, Chylification, and Fæcation*.—That the numerous phenomena attendant upon indigestion may, and very often do, arise from various states of irritation or structural change in the digestive canal, particularly in its villous surface, is unquestionable; and M. BROUSSAIS, although he has pushed the doctrine extravagantly far, has drawn attention to important and too frequently neglected facts. I must, however, contend that disorders of the digestive processes frequently cannot be referred, after the most patient investigation, to such sources; but must be imputed to altered states of the vital or nervous power imparted to the viscera which perform these processes; and that those pathological states generally are more or less intimately associated with debility and altered sensibility, or even wholly consist of these states, affecting either the alimentary canal and related organs, or the œconomy throughout. (See DEBILITY, § 15.)

10. A. In respect of *chymification*, or digestion in the stomach, the above positions cannot be disputed. For disorders of this function often depend upon causes which observation has proved incapable of directly influencing the organisation, or of acting otherwise than upon the sensibility or the other manifestations of life displayed by this viscus, or even by organs affecting it sympathetically. The influence of moral emotions not only upon chymification, but also upon chylification and fæcation, is well known. Moreover, the stomach has often presented after death no lesion to account for the total deprivation of func-

tion long experienced during life; and even when organic changes have been observed, they have not always been such as usually arise from inflammatory irritation or action: for it should not be forgotten, that structural lesions may also proceed from *sub-action*, or from conditions of vital power, and of vascular action, diminished as to grade, and modified in kind from the healthy standard. Indigestion may therefore arise—(a) from depression or modification of the nervous influence; giving rise, 1st, to imperfect or disordered action of the muscular coats of the stomach; 2d, to a diminished or modified secretion of the gastric juices; (b) from a morbid state of the mucus secreted by the follicular glands of the stomach, either connected with, or independently of, irritation, (*Embarras Gastrique* of the French); (c) from inflammatory irritation and various organic changes; and, (d) sympathetically, from functional or structural disease of adjoining or remote organs.

11. B. The observations now offered apply equally to the function of *chylification*, which, whilst it is often disturbed by inflammatory irritation and organic changes, is as frequently disordered from modifications of the vital or the organic nervous influence supplying the duodenum, the small intestines, and their related organs, particularly the biliary and pancreatic apparatus. When this influence is depressed, exhausted, or in other respects modified, then imperfect and irregular action of the coats of the duodenum and small intestines; deficient, or insufficiently elaborated, or otherwise morbid secretions from their internal surface, and from the liver and pancreas; and alterations of sensibility, as well as of tonic contractility must be the result; whether organic change be superinduced or not;—such change most commonly being the remote consequences of neglected and long continued functional disorder, or of its repeated reproduction by the numerous agents which occasion it. As respects chylification, the result must be an imperfectly formed chyle, which undergoes the further process of assimilation either with difficulty or insufficiently, occasioning various disturbances or diseases, expressed chiefly in the secreting or depurative viscera, as well as in the body generally. Also, when the vital influence is insufficiently exerted on the organs of chylification, the materials on which they act, more readily assume those combinations to which their chemical affinities, assisted by warmth and moisture, dispose them. But when their vital energy is duly exerted, the secretions poured out by the glands and surfaces, and intimately mixed with the ingesta from the commencement of mastication, are so far imbued with that influence which pervades the œconomy, and converts other substances into those structures, with which it is itself so intimately associated, as to withstand purely chemical affinities, or to change them into such as are strictly vital. And as this controlling and self-perpetuating power is more and more weakened, so are the purely chemical forces more strongly exerted, until various new combinations, either of a gaseous or of an acid or acrid nature, are formed, whereby the digestive tube is inordinately distended, irritated, and, ultimately, permanently changed in structure, capacity, and even in position.



12. *C.* The processes of *fecation*, although obviously and most severely disturbed by inflammatory irritation and organic changes, are also impeded or otherwise disordered without any such lesions. A deficient exertion of the vital endowment, through the medium of the organic nerves supplying them, or alteration of their sensibility, and the resulting modifications in the tonic and insensible contractility of their muscular coats, and in their exhaled and secreted fluids, are even more frequently the causes of disorders in the functions of defæcation than appreciable organic change; and even when this latter becomes developed, in this part of the canal as well as in others, it is still more frequently the consequence of neglected and continued functional disorder. (See CONSTIPATION.)

13. *iii. Morbid States of Sensibility of the Digestive Canal.*—These states consist chiefly of pain in various grades and modifications. Acute, lancinating, dull or heavy, gnawing, burning, pungent, remittent, periodic, &c.; and, whilst they are often attendant upon,—particularly burning or gnawing pain,—rather than occasioned by, organic lesions, especially of the external tunics of the canal, they are still more frequently unaccompanied by any appreciable change. Indeed, the numerous alterations of texture found in the gastro-intestinal mucous and sub-mucous tissues are seldom attended by severe pain. M. ANDRAL very justly remarks that the mucous coat may be acutely, or chronically diseased—may be inflamed, thickened, softened, or deeply ulcerated—without any uneasy sensation, or, at most, with griping pains on going to stool. The abdomen of persons, whose intestines are ulcerated during adynamic fevers, may be even pressed in all directions, without the sensibility being painfully excited, unless the ulcers extend in depth to the peritoneal surface. On the other hand, the alimentary canal is frequently the seat of the most severe, or even excruciating pain, without its texture being at all affected, as proved not only by *post mortem* examinations, but also by its causes, its sudden accession and departure, and by the *juvantia* and *lædantia*.

14. *A.* The *stomach* is the most prone of any part of the digestive canal to experience changes of sensibility, probably owing to the numerous agents, chiefly ingesta—solid and fluid—hot and cold—bland and relaxing—exciting or irritating—depressing or inflaming—indigestible or unwholesome—to which it is subjected during life; and often to all these, in hurtful variety and inordinate quantity, producing opposite impressions on, with extraordinary distension of, its coats. Add to the above, the various passions and emotions which disturb the nervous and circulating systems, and the reasons wherefore the stomach manifests not only the simpler states of indigestion, but also the severe and complicated forms characterised by altered sensibility, disordered action of the muscular coats, and morbid secretion—as *cardialgia*, *flatulency*, *acid* and *acrid eructations*, *pyrosis*, *rumination*, *bulimia*, *gastrodynia*, and *cramp* or *spasm*, will be apparent. These, although sometimes associated with organic change, rather than occasioned by it, are most commonly referrible merely to modifications of vital and nervous power and altered sensibility—pathological states, however, which will

often superinduce organic changes when prolonged, or aggravated by injudicious treatment and diet.

15. *B.* The *small* and *large intestines* also experience very remarkable changes of sensibility, often without any manifest lesion of structure, but generally in connection with irregular action of the muscular tunics, diminished secretion and exhalation, and an increased production of flatus. The different forms of *colic*—the *flatulent*, *hysterical*, *lead*, *Madrid*, *bilious*, or the *dry belly-ach*, &c.—are the most marked examples of this state of functional disorder, which may, however, terminate in, or be complicated with, various alterations of texture, or of position and capacity.

16. *iv. Disorders of Secretion and Excretion.*—The secretions and excretions of the digestive tube are disordered in various ways, and often to a very considerable extent, without much general disturbance being the result.—*A.* When the nervous influence of the *stomach*, and occasionally also of the *duodenum*, is suddenly impressed or seriously disturbed, *nausea* and *vomiting*, with increase of the secretions of these viscera, are often, although not always, or even generally, produced. Such disorder may depend on the state of the stomach; on disease of the small intestines, especially of the duodenum; on obstructions in some part of the canal; on affections of distant organs, as the nervous centres, the kidneys, the uterus, &c.; on intense impressions made upon any part of the frame, or on severe affections of the whole system. Even when vomiting is occasioned by a morbid state of the stomach itself, it is as often the result of an altered condition of nervous influence, as of structural change; although in many cases both pathological states co-exist. This act may arise not only from irritating or injurious substances taken into the stomach, but also from similar matters absorbed or introduced into the circulating current, and from morbid secretions poured out from its own villous surface, or regurgitated into it from the duodenum. Ingesta of the most opposite kinds—whether highly stimulating and irritating, or depressing and septic, or simply relaxant—may occasion it; the stomach evincing in either case the disposition to eject whatever is injurious to the frame; the retching often continuing long after the noxious matter is thrown off, apparently in consequence of the morbid impression made by it upon the nerves supplying the organ, and through their channel upon the vital manifestations of the body. Vomiting from irritating or injurious matters in the circulation, arises most probably as much from the effect produced by them on the vital endowment, especially as manifested in the organic nervous system, as from their effect upon the stomach itself through the medium of the blood circulating in it. Indeed, MAJENDIE has shown, that attempts at vomiting will follow from this cause, even when the stomach has been removed from the body. In delicate persons, the sight even of certain substances, or the odour of others, particularly if they at any time had overloaded, or disagreed with, the stomach, will produce nausea and vomiting. The repeated retchings supervening with the collapse consequent upon excesses is probably favoured by the morbid and accumulated secretions generated



during the excitement and the nausea following it. In this case, the vomiting is attributable chiefly to the exhaustion of the nervous influence of the organ, and to the affection of the nervous centres; a moderate repetition of the stimulus, or of some analogous excitant, removing the disorder. *Sea-sickness* is, however, the most conclusive illustration of the frequent origin of vomiting in modifications of the nervous influence. These facts, as well the effects of irritation of the uvula or pharynx, and of inflammatory affections of the brain, and other remote viscera, warrant the conclusion that vomiting is chiefly a nervous affection; and that, although it is frequently attendant upon, it is often also entirely independent of, change of structure, either of the stomach, or even of any other part. (See VOMITING.)

17. *B.* Owing to the superabundance, or the irritating nature of the secretions formed by the intestinal villous surface, or to the quantity or quality of the biliary and pancreatic secretions, or to both pathological states conjoined, *diarrhœa*, *lientery*, or *dysentery*, may take place, independently of organic lesions and even when such lesions exist, it is generally to the co-existence with them of increased or morbid secretions proceeding from one or more of these sources, that these diseases are to be imputed. Even in *cholera*, in which the eruption of an increased quantity of morbid secretions into the duodenum occasions copious discharges from the stomach and bowels, with cramps, &c., we are not justified in concluding that any organic change is present beyond simple irritation, of a temporary kind, excited in the villous surface by the acrid state of the secretions passing along it.

18. II. LESIONS OF THE TISSUES COMPOSING THE DIGESTIVE CANAL.—The difficulty of distinguishing between the slighter lesions of structure, and changes occurring shortly before and after death, as well as states of the villous membrane connected with the conformation and diathesis of the individual, has already been pointed out. More frequently, however, no such difficulty exists, the change being of a kind that will not admit of a doubt as to its nature. But in judging of very many of these more palpable lesions, we shall fall into numerous errors, if their more prominent appearances merely be considered, without reference to their causes, and to the state of vascular action which occasioned them, and to the conditions of vital power with which the vascular action was associated. For various changes of a remarkable description, closely resembling each other, may arise from very different states of vascular action and of vital power—either from sthenic inflammation, or increased organic action of the tissue, or from sub-action or diminished organic action, or from perverted nutrition of the part. To ascertain the nature of the morbid process, therefore, which gives rise to very manifest lesions, from even the closest examination of these lesions themselves, is frequently a matter of difficulty, and often of impossibility, in the present state of our knowledge; and it is chiefly by connecting them, as far as we may be enabled, with their causes, and with the conditions of vital power and of vascular action, that we can approach to accurate views of their nature. This I have

attempted to do more fully and appropriately in the article INFLAMMATION; and have only referred to these important and too much neglected pathological states, when the nature of the changes required that they should be briefly noticed.

19. It should be understood that the several lesions about to be noticed, may exist either separately, or variously associated the one with the other; in some cases, in the same part of the canal, and holding the relation of cause and effect; in others, in distinct or remote parts, and without any such connection. As it will, however, be impossible to describe the changes observed in this part, in their numerous states of association, they will be considered separately, but with reference to such of these states as are most common. I shall, conformably with this plan, notice—*first*, changes of vascularity; *second*, lesions of the tissues composing the canal; *third*, lesions of internal secretion, comprising adventitious productions; and, *fourth*, changes of capacity and position.

20. i. *Changes of Vascularity, or Lesions of Circulation.*—*A. Anæmia*, or diminished vascularity of the digestive canal is sometimes observed; extreme paleness, existing either throughout, or in parts only. It is usually attended by more or less attenuation of the gastro-intestinal parietes; and is most frequently met with in subjects that have died from the exhaustion of chronic diseases, or after severe fevers. In these cases, ulcers are often found co-existent with it, that are as pale and bloodless as the surrounding tissue. This association of anæmia with asthenic ulceration is not infrequent in children who have suffered from chronic diarrhœa and lientery, with or without mesenteric disease, and who have died comatose. Anæmia of the digestive canal is also observed in cases of fatal hæmorrhage from other organs.

21. *B. Increased vascularity*, not arising from the causes stated above (§ 3, 4.), but from excited organic action, is of extremely frequent occurrence. As it is generally confined to the villous membrane, the canal externally will often exhibit no appearance of it, or will even be unusually pale; for sometimes, when this membrane is intensely red, the subjacent cellular tissue even, and the rest of the tunics, are quite devoid of colour. It is owing to this circumstance chiefly, that the existence of increased vascular action in cases of bowel complaints has been, until recently, so much overlooked amongst pathologists. This connection of inflammatory injection of the villous coat with disorders of the digestive tube had not, however, entirely escaped the observation of GLISSON, BAGLIVI, MORGAGNI, L. BANG, and C. SMYTH, and was afterwards placed in its true light by PINEL, BAILLIE, MARCUS, HILDENBRAND, ABERCROMBIE, LATHAM, ANDRAL, GENDRIN, BILLARD, and others (see *Refer.*); whilst BROUSSAIS and his followers made it the basis of a pathological doctrine, and stretched it beyond its legitimate limits.

22. Increased vascularity may be seated chiefly or separately in the villous membrane itself, or in its villi, or in the follicles either disseminated through or aggregated in it, or it may affect two or all of these anatomical elements



simultaneously. —(a) When the *membrane* itself is injected or inflamed, the appearances are diversified; but at first the light can still be partially seen through the coats, the vessels being disposed in a finely arborescent form. Somewhat later, the opacity is complete; the *redness* being at the commencement in spots, stars, patches, streaks, or bands; and of a rose or florid colour; but afterwards more deep, and dark or purplish; and terminating either insensibly or abruptly. —(b) When the *villi* are inflamed, the internal surface presents a number of red points, which are often closely crowded together, rendering the membrane opaque. Upon a close inspection, these points are found to consist of the villi; their injection occasioning the change of colour, which is either limited to their summits, or is extended from thence to their bases. In some instances, the injection is altogether confined to the villi; in others, the membrane itself is also more or less affected. In many cases, the villi are of a brownish or even blackish colour, particularly in persons that have had chronic diarrhoea. Active injection of the villous membrane may thus exist in an acute or chronic state, without any further change, for periods of very variable duration. In some cases, it will terminate in softening or ulceration in a few days; and in others, signs of irritation may exist for a very long time, and still simple injection without change of structure will only be found. —(c) When the *follicles* are the seat of increased vascularity, the injection is in the form of a small circle or *areola*, consisting of interlaced capillary vessels, with slight elevation of the membrane of the part, owing to the injection of these vessels and the tumefaction of the follicle. Often a smaller red circle is placed within the preceding, and situated, as M. ANDRAL supposes, in the margin of its orifice. Sometimes the situations of the follicles present both these inflamed circles quite distinct; at other times they both increase, and at last meet each other. In some cases, instead of these reddish circles, brownish or blackish circles, similarly disposed and elevated, are met with. In other instances, where this disposition of the injected vessels is observed, there is neither tumefaction within the circle, nor depression in the central red point, to indicate the existence of a follicle. Inflammation of the follicles of BRUNNER and PEYER has recently attracted great attention owing to the writings of BRETONNEAU, TROUSSEAU, and others on the subject (see the *Bib. and Refer.*).

23. Increased vascularity of the digestive canal is seated either (a) in the arterial and other capillaries, (b) in both the capillaries and venous trunks, or (c) in the larger vessels only. The *first* of these is an undoubted evidence either of irritation or of incipient inflammatory action, if no further lesion exist. The *second* may belong either to these pathological states, or to congestion, of a morbid kind existing during life, or of a mechanical nature occurring after death. The *third* may be the indication of pre-existing inflammation, partially subdued, or of increased determination of the circulation to the part. It is of importance to recollect, when judging respecting the nature of increased vascularity observed in the digestive tube, that, when it arises from augmented organic action, it com-

mences in the capillaries and extends to the larger vessels, —the former only being found injected after death, in many instances; whereas, when it proceeds from passive congestion, it begins in the large veins and extends to the capillaries—the former only sometimes continuing injected after dissolution. When the vascularity is active, it commences generally with a capillary or reticular injection, which increases until an uniform red tint takes place, and every transparent interval disappears, owing to the crowded state of the injected capillaries. As the vascularity declines, it again assumes the reticular form, and at last only some large vessels are observed in an injected state.

24. Can the colouring of the part be an index of a *primary chronic*, or of a *consecutively chronic*, state of inflammation, or of an *acute* inflammation which has supervened on the chronic? An approximation only to the truth can be made in answering these questions. M. ANDRAL supposes that the brown, grey, and slate colours especially belong to chronic irritation. But substances taken into the stomach, and proving quickly fatal by the extensive and intense irritation they occasion, or by their noxious impression on the nerves of organic life, or by both modes of action, usually impart a brown, dark, or purplish colour to the injected villous surface. The inflammation also of this surface, in adynamic fevers, is often of a very dark ochry or brown colour; and the asthenic forms of inflammatory action, as well as many of those in which the blood is contaminated or otherwise morbid, frequently present similar hues. Also a red colour may attend chronic as well as acute inflammatory action, although much less frequently. The above lesions of circulation are generally followed, after a longer or shorter time, according to the state of vital power, the condition of the circulating fluid, and intensity of action, by a change, to a greater or less extent, in the vital cohesion, and tonicity of the tissues composing the parietes of the canal, giving rise to the alterations of texture about to be described.

25. ii. *Lesions of the Tissues composing the Parietes of the Canal.* — A. *Atrophy* may affect only one, or all the coats of the gastro-intestinal parietes. —(a) Atrophy of the *villous membrane* presents several grades: in a less degree, or at its commencement the *villi* are greatly diminished, or nearly or altogether effaced. In a more advanced grade, not only have the villi disappeared, but the membrane itself is remarkably attenuated. In some cases, the villi are obliterated in places, and not in others. In the situation of cicatrised ulcers they are always absent. Atrophy of the villous membrane is met with chiefly in chronic cases, similar to those in which anæmia has been stated to occur; and it is obviously in some cases a *post mortem* change. It is often a consequence of anæmia; but it may accompany ulceration, vascular injection, or other lesions of the digestive canal. —(b) The *muscular coat* may also be atrophied, so that its fibres become much less apparent, the fasciculi wasted and separated by wider intervals, occupied by cellular tissue, from which they can hardly be distinguished. Atrophy of the muscular coat most frequently co-exists with atrophy of the other tunics, but it may also occur when they are hypertrophied,



especially when the sub-mucous cellular tissue is much thickened.—(c) All the coats of the digestive canal may be co-existently atrophied, the parietes of the canal being then remarkably attenuated, and appearing to consist merely of a sero-cellular tissue, which is transparent and colourless, and apparently without villi, follicles, or blood-vessels (ANDRAL, LOUIS, BILLARD, &c.). This change is only met with in any considerable degree in parts of the tube; most frequently in the splenic portion of the stomach, and lowest third of the ilium.

26. *B. Hypertrophy*, or thickening, of the parietes of the alimentary canal may be confined to a single tissue, or may simultaneously exist in all the coats of which they are composed. This change, when far advanced, or seated in the sub-mucous tissue, and particularly when associated with ulceration, has been often mistaken, until recently, by British pathologists for scirrhus, and by Continental writers for true cancer. Although thus generally misconstrued, it appears to have been better understood by RUDOLPHI (*Bemerkungen*, th. i. p. 35.) and THILENIUS (*Med. u. Chir. Bemerk.* i. p. 202.).

27. (a) *Hypertrophy of the villous or mucous membrane* consists of an increase of its density as well as of its thickness, and is thereby distinguished from the slight tumefaction produced by inflammatory injection of its capillaries, and from tumefaction and softening, with more or less discolouration, occasioned by acute inflammation, or intensely irritating ingesta.—*α*. When really hypertrophied, the villous coat may be removed in large shreds, which are harder as well as thicker than natural. When thus altered, it rarely retains its natural colour, but commonly presents either various shades of redness, or a slate-coloured, or a brownish, or blackish tint. This lesion is most common in the stomach; next in the rectum, cæcum, and colon; and least so in the small intestines. It may exist throughout either of these viscera, or in parts or points merely. When the membrane is thickened in the whole or greater part of the viscus, it may be either smooth, or unequal; in the latter case it usually presents a number of elevations separated by depressions, giving it a mammillated or papillary appearance. When the hypertrophy is only in isolated spots or points, it may proceed so far as to produce various elevations, patches, projections, tumours, and polypous growths, with or without narrow pedicles, and which have often been mistaken for fungous or malignant formations; but which, when prominent, are more appropriately termed vegetations or *excrecences*. They have been described by BARTHOLINUS, VAN DER WIEL (cent. i. obs. 56.), DE HAEN (*Rat. Med.* vi. cap. 4.), BAUER, SCHAARSCHMID (*Méd. u. Chir. Nachrichten*, b. v. obs. 10.), SANDIFORT (*Observ. Anat. Pathol.* l. i., et *Mus. Anat.* i. p. 255.), PORTAL (*Anat. Méd.* t. v. p. 243.), BAILLIE (*Ser. of Eng. &c.* fasc. iv. pl. 6.), STARK (*Archiv.* b. i. st. iv. n. 3.), REBIÈRE (*Journ. de Méd.* t. lxiv. p. 619.), ANDRAL, and others. These *excrecences* may either be of the usual consistence and colour of the mucous coat, or they may be harder or softer. They may also present every shade of colour; and be either nearly bloodless, or remarkably vascular. In some cases, their capillary vessels

are so numerous or interlaced as to impart to them an erectile appearance; in others, their veins are large and engorged so as to resemble the morbid productions described hereafter (§48—51.). They have bases of various extent; in some cases large, in others very narrow, or slender pedicles; their summits being either pointed or rounded, or broad, resembling a mushroom. They are found in every part of the gastro-intestinal surface; in the cardiac and pyloric orifices, or any part of the stomach; in the cæcum, in the commencement of the rectum, in the colon, and least frequently in the duodenum and small intestines. About the anal orifice, however, and inferior part of the rectum, they are very common, and are there often produced by the syphilitic virus. Their number varies from one to twenty or more. M. RULLIER preserved a stomach which was studded with about eighty, each of the size of a filbert. They may exist simultaneously in different portions of the digestive canal, as in the stomach and cæcum.

28. *β*. These excrescences should not be confounded with hypertrophy occurring in some of the villi with which the membrane is provided. When much enlarged, the villi project further, and are of a whiter colour, than the rest of the surface; and form small cylindrical vegetations, which may be readily distinguished from excrescences of the mucous coat itself.

29. *γ*. The villi, however, are much less frequently hypertrophied than the follicles. When the digestive canal of adults is studded with very apparent or projecting follicles, we may consider these bodies as diseased, although they may not be really hypertrophied. When they participate in the increased vascularity of the inflamed mucous coat, they become tumid from this circumstance, or from the morbid secretions collected in them, but not truly enlarged. When the aggregated follicles are tumified, elevated patches are thereby formed, giving rise to the *Dothinenteritis* of M. BRETONNEAU. However, as M. ANDRAL has remarked, when thus tumified from increased organic action, their nutrition is often thereby augmented, and they then continue enlarged, or even increase in size, after the morbid vascularity has disappeared, and are then truly hypertrophied. When thus changed, they consist chiefly of small, conical, hard, whitish bodies, with central orifices. This lesion is met with often in persons whose digestive functions had not been disordered, as well as in those who had experienced either acute, chronic, or recurring diarrhœa. But hypertrophy of the follicles may also arise without any signs of antecedent increase of vascularity either in them, or in the villous membrane itself. When this has been the case, the only disorder has been either constant, or recurring diarrhœa; but as often no ailment has been complained of. Enlarged follicles may have their orifices of the natural size, or widened so as to be mistaken for a small ulcer, or narrowed and even obliterated. When this latter occurs, the follicle becomes distended by its secretion, in some cases, to such an extent as to form large globular tumours. The parietes of the hypertrophied follicle may also be transformed into a fibrous, or fibro-cartilaginous, or even a cartilaginous tissue, thereby augmenting their thickness,—a change justly



imputed by M. GENDRIN to chronic inflammation. Hypertrophy of the follicles is most common in the inferior part of the ilium, in the cæcum, in the rectum and colon, and in the duodenum, but is rarely met with in the stomach. It is most frequently a consequence of *diarrhœa*, *dysentery*, and *gastric fevers* (which see); and may be mistaken for tufts of enlarged white villi, and for small white bodies, consisting of the rudiments of *valvulæ conniventes*. It is very common after the bowel complaints of children, amongst whom, however, the follicles are always more manifest than in adults.

30. (b) *Hypertrophy of the sub-villous tissues* may be more or less general throughout one of the principal divisions of the digestive canal, or it may be circumscribed. It is not unusual to find, after chronic diarrhœa or dysentery, the *sub-mucous cellular tissue* much more apparent than usual, or even two or three lines in thickness, in the colon or rectum, or both. It is then denser than natural, sometimes with more or less regularly arranged fibres, or plates, of a pale or pearly white colour, and without any evident blood-vessels. It is often of a homogeneous semi-cartilaginous-like texture; but when thus generally *enlarged* and *indurated*, the hypertrophy is never so great as when it is circumscribed. When it forms, in some part of the canal, a tumour, elevating the mucous surface by its thickness, it constitutes the change to which the term *scirrhus* has been very generally applied, and differs from the diffused hypertrophy only in being circumscribed, and many times thicker. That the tumour occasioned by the circumscribed hypertrophy, whether existing in the cardia or pylorus, is not the result of the production of a new tissue, but arises from enlargement and *induration*—owing to excessive irritation—chiefly of the sub-mucous tissue, is manifest in the early states of the lesion. This may continue to be the only change; but often ulterior alterations take place, and a new structure is developed; the part becomes vascular, is sometimes divided into lobes, and morbid secretions are poured into its substance, whereby it acquires the appearance of areolæ and cells containing these secretions; the fibriles of the cellular tissue between them becoming at the same time more and more hardened and hypertrophied. Frequently the hypertrophy is not confined to the sub-mucous tissue, but is extended to the tissue connecting the muscular and peritoneal coats; hardened, white fibres running between and separating the fasciculi of the interposed muscular coat, and thereby connecting both layers of hypertrophied cellular substance. M. ANDRAL considers these fibres to consist of the cellular tissue placed between the muscular fibres, also in a state of hypertrophy; the latter structure gradually disappearing before the progressive increase and induration of the former. At last, all appearance of muscle is lost, and a mass either of simply hypertrophied and indurated cellular tissue, or of this substance further and consecutively altered, chiefly by the deposition into it of morbid secretions, is placed between the peritoneal and mucous coats.

31. This lesion is generally the consequence of inflammatory irritation long kept up or frequently reproduced in the mucous membrane,

which may be sound, no change of it having existed, or that which formerly existed having ceased. More frequently, however, it is either injected, indurated, softened, ulcerated, or entirely eroded in the hypertrophied part. Hypertrophy of the sub-mucous tissue is most frequent in the stomach and large intestines, particularly the rectum, where it may be either diffused or circumscribed; and the least so in the small intestines, in which it is commonly circumscribed. It is rarely met with in infants. MM. BILLARD and ANDRAL have, however, observed it in them; and I have seen it in the colon of children a few years of age, who had long been affected with chronic diarrhœa. It seldom is seen in the stomach before thirty; but it is common in this viscus between the ages of thirty-five and sixty-five, especially near the pylorus and cardia.

32. (c) *The muscular coat* is sometimes hypertrophied, either alone, or along with the sub-mucous tissue. In the former case, the pyloric orifice of the stomach is its chief seat (CRUVEILHIER, R. PRUS, LOUIS, BOUILLAUD, ANDRAL, &c.), and is much increased in thickness from this circumstance. In hypertrophy of the sub-mucous tissue, the muscular coat, instead of disappearing before the increasing bulk and induration of the cellular tissue that surrounds and penetrates it, as most frequently occurs, and as above described, is sometimes also hypertrophied. In this case, when a section is made of the diseased part, the hypertrophied muscular coat may be traced, in the form of a bluish semitransparent layer, placed between two other layers of a whitish colour, consisting of the sub-mucous and sub-peritoneal cellular tissue also in a state of hypertrophy. This central or muscular layer is traversed by lines of the same colour as the layers on each side of it; the enlargement and induration thus extending to the muscular coat, and through its fibres, by means of their interposed cellular tissue, to that connecting it with the peritoneum. This lesion is most frequent in the stomach, particularly near the pylorus, and constitutes, as well as the preceding states (§ 27.)—often with various alterations of secretion superadded—what is usually called *scirrhus*. (See STOMACH—Diseases of.)

33. C. *Hypertrophy of the nerves and vessels*.—(a) The nerves supplying the gastro-intestinal canal are very rarely enlarged. M. ANDRAL has never observed any such change in them. M. R. PRUS, however, found, in a case of circumscribed hypertrophy of the sub-mucous tissue and muscular coat (*scirrhus*) of a part of the body of the stomach, the right œsophagæan branch of the pneumo-gastric nerve increased to twice its bulk, from the cardia to its disappearance in the tumour. It should be recollected, that the state of the nerves is seldom enquired after in *post mortem* inspections, and that to ascertain the condition of the ganglionic nerves requires the most minute research, which can seldom be devoted under such circumstances.—(b) The *blood-vessels* of the gastro-intestinal tube are very often large and dilated; but this is not hypertrophy. Their parietes are very rarely thickened. M. ANDRAL found, in two cases of chronic disease of the stomach, the parietes of the veins thus changed, constituting true hypertrophy. FORESTUS (*Ob-*



*serv.* l. xviii.; *Schol. ad Observ.* 18.) and VOIGTEL (*Handb. der Pathol. Anat.* ii. p. 95.) have noticed a *varicose* state of the *veins* of the stomach; a lesion which M. ANDRAL has not met in his numerous dissections.—(c) The *lymphatic* vessels, and especially the *glands* of the digestive canal, are very frequently hypertrophied, if the increase of volume so often found in the lacteal or *mesenteric glands* after irritation of the intestinal mucous surface be considered as true hypertrophy. But, in many instances, the enlargement is merely the consequence of vascular injection, and serous or sero-puriform infiltration of their tissue, without any increase of nutrition—the very element of hypertrophy. But after these pathological states have subsided, an evident increase of the bulk and density of these glands remains, whether the primary irritation continues, or has long previously disappeared. When these glands are enlarged, dense, and not very vascular, we may attribute the change to increase of nutrition, according to the state of our knowledge of what constitutes it. But when evident signs of inflammation—as increased vascular injection, redness, and tumefaction—are observed, the change must be chiefly imputed to increased organic action of the blood-vessels; although this condition does not preclude the co-existence of hypertrophy; with which, indeed, increased vascular action, in some grade or other, is very frequently, and even necessarily, associated, and of which it is generally the cause. However, in many cases of what may be called hypertrophy, or, otherwise, enlargement of the lacteal or absorbent glands, instead of being more vascular, they are pale, and even more bloodless and colourless than natural, particularly after chronic diarrhoea, lentergy, and marasmus. The glands through which the lymphatics of the stomach pass are not so frequently enlarged as those of the mesentery. Often, however, those along the curvatures of the stomach and around the pylorus are much increased in size.

34. *D. Softening of the digestive canal* is one of the most common changes observed; and it may be limited to one of the coats, or extended to two or all of them. In this latter case the parietes of the canal may be torn with the greatest ease.—(a) Softening of the *villous coat* is most frequently met with: it occurs in every degree, and either throughout or in parts of this membrane only, the consistence of the other coats being undiminished. This lesion is most common in the stomach, where it has been most minutely studied. In its first stage or grade, it can hardly be removed in shreds, as it may be in the healthy state; and it is readily converted, by scraping, into a kind of pulp. As the softening increases, the slightest touch reduces it to a mucous-like pulp; and at still further advanced periods, it is either no longer uniformly spread over the gastric surface, or it is entirely deficient in parts or throughout, leaving the sub-villous tissue quite bare. This lesion may exist in the whole of the stomach, or in parts of it only,—most frequently in the splenic portion. It is often attended by marked dilatation of the veins running between the coats, evincing the antecedent existence of increased vascular action in cases where other appearances of it may have

vanished. In some cases of children, the softening exists only in a number of small round patches of a red colour; and in others, it is in lines, streaks, or irregular bands. It is probable that the small softened spots which have been also noticed by M. LESTIER may become ulcers from the extension of the lesion to the subjacent tissues. The *colour* of the softened villous coat may be greyish or natural, or white with a bluish tinge, or a dead milky white, or red, brown, brick red, and more rarely purple. Softening, with some one or more of these shades of colour in different parts of the canal, is met with as a consequence of various acute and chronic maladies seated either in the digestive organs, or in remote viscera, especially chronic diseases of the lungs. White softening in the lower part of the small intestine and colon is one of the most common lesions observed after chronic diarrhoea.

35. (b) Softening of *all the coats* of the digestive canal may take place to a remarkable extent, particularly in the stomach and bowel complaints of children, and in the gastric and adynamic fevers of adults. It has been described by JAEGER, ZELLER, F. RHADES, FLEISCHMANN, LAISNÉ, CRUVEILHIER, HAVILAND, WIESEMANN, GAIRDNER, and other writers referred to in the *Bibliography*. In some cases, the parietes of the stomach may be torn with the utmost ease, all the tunics and interposed cellular tissue having become friable and semi-dissolved; resembling, in extreme cases, a kind of jelly, without any trace of organisation, and hence denominated by M. CRUVEILHIER "*gelatiniform softening*." In some of these cases, the gastro-intestinal parietes are modified only in respect of consistence, and have the outward appearance of being sound, until more closely examined. With this loss of vital cohesion, the colour of the part may be either natural, or remarkably pale, or red, and without reference to the acuteness or chronicity of the disease. The splenic portion of the stomach is most liable to general softening of the coats; but it also occurs in the small intestines, and the cæcum and colon. M. ANDRAL states, that he met with reddish softening of the coats of the stomach in a child who had taken sulphuret of potash before death. I believe that this substance, as well as the caustic alkalies, will readily occasion this change, if exhibited in too large doses, or continued too long. As to softening of the gastro-intestinal parietes ever being a *post mortem* change, this pathologist remarks, that it may be established as a general principle, that any softening observed on opening the body at the usual period after death should not be considered as the result of putrefaction. But it may be, when observed in the stomach, the result of the action of the gastric juices, as shown by J. HUNTER and others referred to. It is, moreover, extremely probable that the acrid and morbid secretions of the diseased gastro-intestinal mucous surface may so far act upon any part of it as to soften and to erode it during the latter hours of existence, and the time that elapsed after dissolution. These inferences have received support from experiment and pathological observations (§ 6.). Dr. CAMERER, of Stuttgart, made, in 1818, a number of examinations with a view to the solution of this question; and found that, in all the animals



which had been killed while in good health, the great extremity of the stomach was softened, and if a sufficient time had elapsed, its parietes were dissolved or even perforated; no signs of putrefaction being observed. Whilst, on the contrary, in a dog already evincing putrefaction, no trace of softening existed in the stomach. This physician also found that the fluid collected in the stomach of two children who had died of gelatiniform softening of this viscus, introduced into the stomach of a man just dead, produced, at the end of twelve hours, solution of the coats of the part with which it had come in contact; that a portion of the same fluid had no effect upon the stomach of a living rabbit; but as soon as the animal was dead, or when the pneumogastric and trisplanchnic nerves were divided on each side, this fluid had an immediate action on the coats of the stomach. Hence it must be concluded that softening of this viscus is not unfrequently a *post mortem* change. It ought to be remarked, that softening of any part of the digestive canal has been too generally imputed to inflammatory irritation, owing to the frequency of its occurrence in febrile and inflammatory diseases; and from the action of acrid poisons. But the extreme cases of it that I have had an opportunity of observing, have been the *choleric fever* and *diarrhœa* of infants occurring after weaning, and in children who have died from aqueous effusion on the brain. In most of these it was unattended by vascular injection; the softened parts themselves, and those surrounding them, being either softened merely, or also attenuated or even eroded and perforated, and quite pale, excepting in the course of a few large vessels. I have likewise observed it, but in a different and more general form, in the adynamic and deliquescent states of remittent and continued fevers\*, and in two cases of puerperal disease; the softened parts being more or less discoloured, and sometimes ulcerated, but not perforated. From the condition of vital manifestation in the cases in which I have remarked this change, it may be inferred that it results chiefly from a loss of the organic nervous power, and of the vital cohesion of the tissues previously to death, but is increased by this event, and by the action of the morbid fluids and secretions upon them.

36. *F. Ulceration of the gastro-intestinal parietes* is a frequent and important lesion, and has long attracted much attention in practice. It seems to have been first noticed by AVICENNA (*Canon*. l.iii. fen.16. tr.1. cap.2.), who often makes mention of excoriations and ulceration as a cause of vomiting and diarrhœa; and it has been described by BONET (*Sepulch*. l.iii. sect. xi. obs. 2, 3, *et passim*.), GMELIN, FRIEND, HALLER, FIELD, PENADA, BAILLIE, FRANK, PROST, ANDRAL, and others (see *Bibliog. and Refer.*). It is met with in the parts of the canal in the following order in respect of frequency:—The inferior third of the ilium, the cæcum, the colon, the rectum, the upper two thirds of the ilium, the stomach, the jejunum, and the duodenum. In either of these situations it is a consequence—  
(a) Of softening of the villous coat, without any

evident injection, the ulcer being formed in the centre of the softened part;—(b) Of small inflamed spots of the villous membrane, which is quite sound in the intervals between them;—(c) Of a general injection or inflammation of this membrane, the intervals being more or less red;—(d) Of the sloughing of circumscribed parts of the villous, and sometimes of the sub-villous, and even of the muscular tissues;—(e) Of a change in the mucous follicles, either the isolated, or PEYER's glands, or of both,—generally preceded by obstruction and enlargement of them. These glands first form conical knobs, and are either few or numerous, greyish or reddish, and with or without areolæ (§ 22. c.). Subsequently, a slight depression appears on their summits, owing to enlargement of their orifices, or to an incipient ulcer; this depression gradually becoming more considerable; the tumid glands thus resembling, particularly in their inflamed state, and when they contain a small quantity of puriform matter, the dimpled pustules of small-pox. They were formerly considered identical with these pustules, particularly when found, as is occasionally the case, in that disease; and they have been described as such by FERNEL (*De Abd. Rer. Causis*, l.ii. cap. 12.), BAILLOU (*Epid. et Ephem.* l. ii. p. 207.), HORSTIUS (*Instit. Med. Disp.* 3.), A. PARÉ (l.xiv. cap.i.), PEYER (*Observ. Anat.* ii.), MEAD (*De Variol.* 8c. Lond. 1747, p. 323.), BARTHOLIN (cap. iii. obs. 29.), P. FABRICIUS (*Observ. circa Const. Epidem. Ann.* 1750, § 18.). Pustular ulcers have been particularly noticed in chronic dysentery, by Sir J. PRINGLE, Sir G. BAKER (*Epid. Dysent. of 1762.*), Sir G. BLANE, and Dr. D. MONRO; the last of whom describes the black colour of their bottoms in that disease. These pustular or pimple-like excrescences are often destroyed from the apices to the bases, leaving circular and deep ulcers in their places, that sometimes extend or run into one another when the aggregated follicles are affected, and thereby produce large, irregular, ulcerated patches. Ulceration originating in the follicles may proceed either from inflammatory action, or from obstruction of their outlets, and their consequent distension and irritation by their natural secretion, which had become acrid from the retention, or by the accumulation of a morbid or tuberculous-like matter, which imparts to them the appearance of white granules; this change being succeeded by ulceration, often without any apparent increase of vascularity.—(f) Ulceration may also arise from disease of the sub-villous tissue, instead of commencing in the villous coat itself, as in all the preceding states. In this case the sub-villous tissue is the seat of various morbid secretions—as of tuberculous matter—which irritate the villous coat, inflame it, and at last ulcerate it; or which, by interrupting the connection of a portion of this coat with the parts beneath, cause it to sphacelate, leaving an ulcer-like excavation in its place.

37. *Ulceration of the digestive tube* is—or rather is an attendant upon—either an *acute*, or a *chronic* disease,—more commonly the latter. It is very rarely acute in the stomach, but is more frequently so in the small and large intestines. The *number* of ulcers is various—from one to some hundreds. They are generally only few, or even single, when they occur in the sto

\* I should state, in support of my own originality as to this change in fevers, that it was noticed in a paper read by me to the London Medical Society in 1819, and published in the Quarterly Journal of Foreign Medicine for Jan. 1821.



mach; and very numerous, crowded together, and confluent, in the ilium and large intestines; in which latter, however, they are sometimes met with singly, or few in number, and isolated. Their *form* is usually round or oval; but they are also sometimes linear and irregular. They are most frequently *seated* on one side of the canal, but they may occupy its circumference. Their *margins* are either white, pale, red, or of deep brown; the portion of villous membrane forming them, being either of natural thickness and consistence; or softer, harder, thinner, or thicker. In some cases the surrounding sub-villous tissue is thickened and indurated. Their *bottoms* consist of different tissues, according to the depths to which they may have penetrated. In some instances they are so slight as to appear like *abrasions* or *excoriations*; and in these the mucous coat still remains at their bottoms, the villi only having been destroyed. More commonly, however, the villous coat is penetrated; the sub-villous tissue, which is usually either grey, red, brown, or blackish, soft and fungous, or hard and scirrhus, forming the bottom of the ulcer. In other cases, neither the surrounding villous membrane, nor the cellular tissue below it, is further altered than as regards the solution of continuity, and sometimes diminution of consistency, the bottoms and margins of the ulcers being white, pale, without inflammatory appearances, and occasionally remarkably softened. These alterations are common in the stomach and bowels of children who have suffered diseases of these organs, or of the brain, after weaning; and in adults who have died of pulmonary maladies, or of bowel complaints after fevers. Dr. J. GAIRDNER considers that they are not true ulcers, but erosions of portions of the coats which were previously diseased, by the juices of the organs after death. I have seen many of these cases, chiefly in children, and believe that the principal part of the change must have taken place previously to dissolution, which had most probably rendered the surrounding tissues less vascular, and further diminished their already weak cohesion, long before the period at which these changes usually supervene (§ 35.).

38. As the ulcers deepen, the sub-mucous and the muscular tissues are successively penetrated, and in some cases without any appearance of vascularity in either the bottoms or the margins of the ulcers, or in the intervals between them; these latter cases generally occur in the diseases already alluded to, and in cases of great asthenic or vital depression, sometimes associated with anæmia or a cachectic habit of body; the ulcers assuming a truly phagedenic character. When the peritoneal coat is reached, it is either thickened, by a development of the cellular tissue connecting it with the muscular coat; or it is inflamed, the vascular injection being evident, and sometimes attended by an effusion of lymph, on its free surface, giving rise to partial adhesions between it and the opposite parts. In other cases, particularly in the asthenic ulcers now noticed, the peritoneum at their bottoms is thin, transparent, and pale; no coagulable lymph being thrown out upon its free surface, owing to the weak and cachectic state of the frame. A single small ulcer may penetrate deeply, and perforate the intestine; whilst a similar result

may not arise, although the ulcerations are both numerous and large.

39. The coats in the *intervals* between the ulcers, as well as the parts immediately surrounding them, may be of natural colour, consistence, and thickness; or more or less either softened, injected, tumefied, thickened, or hypertrophied, and variously coloured. The intervening *villous surface* is often of healthy colour, but softened, and studded with enlarged follicles; and although it is more frequently slightly injected, yet, in some cases, the opposite condition already noticed obtains. The *sub-villous tissue* is often more or less thickened and indurated where the ulcer penetrates the villous coat, the ulcer appearing in the centre of a thickened or hypertrophied mass. The *cicatrization* of ulcers has been observed by BALDINGER (*N. Magazin*, b. ii. p. 347.), MALE, ABERCROMBIE, ANDRAL, TROLLET, BILLARD (see *Bibl. and Refer.*), and others. A large cicatrised ulcer was found in the stomach of M. BÉCLARD, who had long experienced disorder of this organ. ANDRAL refers to several cases, in two of which the mucous membrane was evidently reproduced. The changes that take place on the peritoneal surface, when it becomes the bottom of the ulcer, as well as when it is perforated, have a marked reference to the state of vital power; under usual circumstances, and in a sthenic state of the system, the adhesions already noticed take place; but in an asthenic habit of body, coagulable lymph is not produced, or not in such a state as to form adhesions; and often merely an aqueous or turbid fluid is exhaled; sometimes long before the ulcers have penetrated far through the parietes of the canal. Thus ascites may supervene in any of the stages of ulceration, as observed by PROST (*Méd. Eclair. par l'Ouver. des Corps*, t. ii. p. 52.) and others.

40. *G. Perforations of the digestive canal* have recently attracted much attention; but they had not passed disregarded in former times. Among the numerous writers of the 16th, 17th, and 18th centuries, who have noticed this lesion, a very great proportion, having observed it associated with intestinal worms, imputed the perforations to them,—an inference not confirmed by more accurate modern research; the worms having merely passed through the openings they found ready made. Instances, however, of this lesion unassociated with the entozoa have been recorded by MORGAGNI (*Epist.* xxxi. art. 2.); MONRO, VETTER (*Aphorismen*, &c. b. i. p. 193.), BANG, HUNTER, GERARD, PORTAL, BRESCHET, LAENNEC (*Journ. de Méd. Cont.* vol. iv. p. 557.), PERCY (*Ibid.* vol. iii. p. 510.), LEROUX (*Ibid.* vol. xv. p. 239.), PENADA, JAEGER (*Hufeland u. Himly. Journ. d. Pr. Heilk.* May, 1811.), GISTREN (*Ibid.* July, 1811.), MARCUS (*Ephem. riden der Heilk.* b. i. heft ii.), CLOQUET (*Nouv. Journ. de Méd.* t. i.), LOUIS (*Archives Génér.* &c. t. i. p. 17.), LEGALLOIS (*Ibid.* vol. vi. p. 68.), CHAUSSIER, RULLIER, EBERMAIER, GAIRDNER, ABERCROMBIE, ARMSTRONG, &c. (see *Refer. in Bibliog.*). This lesion may arise in various ways: (a) It may be partly or altogether a *post mortem* change, and attended by softening and thinning of the surrounding tissues; (b) or it may be caused by an eroding ulceration of the tunics, without injection, but with softening and thinning of the margins; (c) or by a circumscribed



slough involving all the gastro-intestinal tunics; (d) or by an ulcer that has penetrated all the coats; (e) or by rupture of a previously softened or otherwise diseased portion of the parietes.

41. (a) Perforation from the action of the *gastric juice* is always in the depending part of the stomach; its size is large and irregular, its margins are fringed and thin; and the surrounding tissues are pulpy or gelatinous and transparent, having a semi-dissolved appearance, and a pale, whitish, yellowish colour, sometimes streaked with brown or black lines from the action of the acid juices on the blood remaining in the capillaries.—(b) Eroding ulcerations of the stomach, such as have been described above (§ 35—37.), and which are with difficulty distinguished from the *post mortem* effects of the gastric juice, may end in perforations, having pale, thin, and soft edges, especially in children. Dr. COSTE records two instances of such perforations in the stomachs of adults, caused by the oxymur. of mercury and spirits, long and largely employed.—(c) A portion of the canal very rarely *sloughs* so as to involve all the coats, and to give rise to perforation when the slough is thrown off, excepting in cases of poisoning by acids, and of strangulated hernia.—(d) *Ulceration* is the common cause of perforation, and is most frequently, in such cases, seated in the solitary or aggregated glands of BRUNNER and PEYER.—*α*. It may occur suddenly, and peritonitis supervene, the patient having previously appeared in good health. Such instances are recorded by MALE, ROGERS, C. SMITH, CRAMP-TON, TRAVERS, LAENNEC, ANDRAL, and BOURIENNE (*Journ. de Méd.* t. xxxvi. p. 464.), as having occurred in the stomach; and by NEUMANN and HUFELAND (*Journ. der Pract. Heilk.* b. ix. p. 170.), the perforation having taken place in the duodenum and jejunum.—*β*. Perforation is more frequent in the course of, or during convalescence from, the gastric and enteric form of continued fever, particularly in the epidemic or rather endemic forms of it, similar to those described by M. BRETONNEAU under the name of *Dothinenterites*, and previously by ROEDERER and WAGLER by that of mucous fevers. But it may occur in all fevers of an adynamic form, the surrounding portions of intestine being of a dark or dirty brown, or ochry colour, softened, and often ulcerated in numerous places, or studded with minute ulcers of the aggregated glands. This change has been well described by BRIGHT, CHAMBERS and HEWETT. (See FEVERS—*Diseased Appearances in.*)—*γ*. It is also met with after chronic complaints of the stomach or bowels, which are sometimes attended by much pain or retchings, as in the cases recorded by J. MOORE, M. WORKMAN, ELLIOTSON, and HEIM (*Horn's Archiv.* Jan. 1822.), but more frequently by little acute suffering, until after perforation, followed by peritonitis, has taken place.—*δ*. It may also supervene during chronic disease of the lungs, owing either to simple ulceration of the glands, or to softening of tubercular matter deposited between the gastro-intestinal coats, and consequent ulceration, as in the case recorded by M. LEGALLOIS (see *Refer.*); perforation from this latter cause sometimes occurring independently of pulmonary disease, particularly in children.—(e) Perforation from *rupture of an*

*ulcerated*, cancerous, thinned, softened, or otherwise diseased part of the canal, is most frequently observed in the stomach, and in the colon or cæcum; and is sometimes favoured by stricture, thickening, &c. of the portion below it; the rupture usually arising from the over-distension of the diseased part of the canal, from external violence or pressure, and from straining at stool or vomiting. Most of the cases of rupture of the stomach and bowels recorded have been consequent upon some one of the changes already described, as may be seen in the cases recorded by MORGAGNI (*Epist. liv. art. 15.*), ANDRY (*Hist. de la Soc. Roy. de Méd.* 1776, p. 257.), LIEUTAUD, ACREL (*N. Schwed. Abh.* b. ix. n. 3.), PORTAL, RICHTER (*Chir. Biblio.* b. xii. p. 403.), SOEEMMERRING (*Notes, &c.*), SANDIFORT (*Observ. Anat. Path.* l. iv.), ZEVIANI (*Mem. di Matem. e Fisica della Soc. Ital. Veron.* t. v. 1790.), HUFELAND (*Journ. d. Pr. Heilk.* b. v. p. 819.), BOUILLAUD (*Arch. Gén. de Méd.* vol. i. p. 534.), MARJOLIN (in *Ibid.* vol. ii.), ANNESLEY, CRAMP-TON, ELLIOTSON, LISLE, F. DAVIS (in the duodenum), ABERCROMBIE, W. COOKE, and others.—(f) *Ruptures* of the stomach and duodenum, without, as well as with, vomitings, but without any organic change or violence sufficient to account for the occurrence, have been observed by DUPUY, LALLEMAND, CHEVALIER, and B. BROWN; but, probably, softening or atrophy, or thinning of the coats also existed, although not mentioned. Perforations of the digestive canal are most frequent in the stomach, especially in the splenic portion. In other parts of this canal they seldom supervene, except at the bottom of ulcers; whilst in the stomach they are more commonly produced by the other causes above enumerated. They may, however, exist simultaneously in different parts of the intestinal tube; and may occur at every age. CRUVEILHIER, WIESEMANN, GAIRDNER, and BILLARD have observed them in young children. I have seen them as early as two and three months in infants deprived of their nurse's milk; but they are rarely met with until after weaning.

42. When perforation has taken place, various consequences ensue, according to its situation, and the disease and circumstances in which it has occurred.—(a) The contents of the viscus generally escape through the opening into the peritoneal cavity, and produce *acute peritonitis*, soon terminating fatally. But this is not a constant result; for the perforation may give rise to *chronic peritonitis*, under which the patient may continue to linger for several months. I have seen this in two instances—one in an adult, and another in a child. M. ANDRAL notices a case in which *lumbrici* escaped into the peritoneal cavity through the opening, and occasioned merely an obscure lingering irritation.—(b) The perforation may communicate with the cellular tissue outside of the peritoneum, as when the cæcum and rectum are penetrated, and give rise to abscesses and fistulæ. I have referred to cases of this description, one of which occurred in my own practice, in the article on the CÆCUM.—(c) In other cases, the gastro-intestinal contents do not pass into the abdominal cavity, owing to the circumstance of the peritoneum having, previously to its perforation, become inflamed, so as to throw out coagulable lymph



on its surface, which excites inflammatory irritation in that part of it directly opposite, and thereby forms adhesions between them, and shuts the opening. When this occurs, other consequences ensue. — *α*. The adhesion may take place to some part of the peritoneum reflected over the abdominal parietes, and the ulceration, by penetrating it, may also occasion abscess or fistula between the peritoneum and the walls of the abdomen. OSIANDER (*Denkwürdigkeiten*, b. i. p. 99.) has recorded a case of this description; and NEBEL, LIEUTAUD, VETTER, GODOT, JACQUINELLE, and B. GOOCH, instance others, in which the inflammation and matter thus formed advanced externally and opened in the left hypochondrium, a fistulous communication being thus established between the stomach or any other part of the digestive tube and the external surface. In this way *artificial anus*, or *fistula in ano*, commonly arises, when some part of the *intestinal canal* is perforated. — *β*. Owing to adhesion having taken place between the surface of some viscus and the penetrated peritoneal coat of the canal, the former either stops up the opening, preventing the escape of the gastrointestinal contents into the abdominal cavity, or becomes itself penetrated by the ulcerative process extended thither. MECKEL (*Epist. ad HALLER. Scrip.* vol. iii.) found the opening in the stomach closed by the omentum accreted over it. ZEVIANI, CHAUSSIER (*Bull. de l'Ecole de Méd. de Paris*, 1808, p. 41.), and LEROUX (*Journ. de Méd. Cont.* vol. xv. p. 239.), observed it covered by the spleen, into which the ulceration had partially penetrated. KEPPELHOUT (*Sect. Cadav. Path. L. B.* 1805, p. 19.) met with a similar connection with the liver. M. ANDRAL saw an ulcer in the ascending colon, the bottom of which was formed by the substance of the kidney; and M. RAYER, a perforation of the duodenum stopped by the liver. Perforations of the stomach may be closed not only by the liver and spleen, but also by the diaphragm and transverse colon, and even may be likewise carried through either of them. M. ANDRAL records cases in which the perforation passed through the stomach and diaphragm into the thorax, and also into the substance of the lungs, the serous surfaces of each having previously adhered; and a communication had thereby been established between the cavity of the stomach, and either that of the pleura, or that of the bronchi. When the viscus which becomes accreted to the surface of the perforated portion of the canal has itself a cavity, then a communication generally takes place between them; thus CAMPER (*Mém. sur le Prix*, &c. t. v. n. 9.) met with an opening into the bladder. Indeed, communications thus formed with either the bladder, uterus, or vagina, are not very rare. A case occurred to M. CHOMEL (M. ANDRAL'S *Anat. Path.* vol. ii. p. 136.), in which the duodenum communicated with the colon, through the gall-bladder, which adhered to both; and cases are not very uncommon, in which perforations and accretions of the serous surfaces of several parts of the digestive canal take place, and openings are thereby directly formed between them. I have seen communications thus existing in the same case between opposite parts of the small intestines in two places, and of the small and large

intestines in three places. In another instance there existed no less than four or five such communications, each of which was of course a double perforation. These changes have been observed by me in four cases in children; and in all, the perforations were associated with chronic peritonitis. Dr. G. GREGORY (*Trans. of Med.-Chirurg. Soc.* vol. xi. p. 258.), has recorded a similar lesion; and an instance, in which it occurred in an aged person, is given in the third volume of the *Bulletins* of the Faculty of Medicine of Paris. Dr. ABERCROMBIE found an ulcerated passage existing between the stomach and colon, fæculent vomiting having preceded death; Mr. A. BELLOT detected several perforations, forming openings between the small and large intestines, and into the abdominal parietes of an adult female; and M. C. BROUSSAIS observed carcinomatous ulceration and perforation of the stomach, opening into the *vena porta*.

43. In all these, excepting the second perforation, by which a communication is established between contiguous portions of the canal, as in the cases now alluded to, the opening takes place from *within outwards*. But the perforation may be produced in an *opposite direction*, as where abscesses of the liver burst into the stomach or colon. M. CAYOL (*Journ. de Méd. by CORVISART, &c.* vol. xiv.) mentions a case in which an abscess in the kidney burst into the ascending colon. Abscesses, perforating, and opening into, the rectum, that had formed, in one case between it and the uterus, and in another between it and the sacrum, during convalescence from fever, have occurred in the practice of the author.

44. iii. MORBID SECRETIONS IN THE DIGESTIVE TUBE.—These may form on the free surface of the villous coat, or in the substance of the parietes of the canal. — *A. The secretions and fluids found on the internal surface of the villous coat* are — 1st, the natural secretions altered from the healthy state; and, 2d, those which are altogether adventitious and foreign to this situation. — (*a*) *The mucous secretion and the aqueous and gaseous exhalations* may be increased in quantity, and otherwise modified. — *a*. The *mucus* covering the villous surface is often greatly increased in quantity, and modified in consistency, either throughout the tube, or in portions of it only; this membrane itself being commonly of a bright red, and more or less injected; or of its natural colour, or sometimes even paler than usual. — *β*. The *aqueous exhalation* is also occasionally increased on the villous coat, and the vessels more or less congested, particularly the veins. The existence of increased aqueous exhalation, connected most probably with determination of the circulating fluid, is evidently the chief pathological state in cholera and serous diarrhoea. But vascular congestion is not always found upon dissection in those cases, especially if the person have died of some other disease, of which serous diarrhoea was a contingent symptom. In these the parietes of the intestines are generally attenuated and pale, and contain more or less of a serous, yellowish, or colourless fluid. — *γ*. The *gaseous fluids*, of which the digestive canal usually contains more or less in health, are often greatly increased, and are sometimes a very important symptom, although not constantly or generally con-



ned with any one pathological state. Increased exhalation of the intestinal gases is, however, a very frequent, although not a constant, result of inflammatory irritation of the villous membrane, or of disease of PAYER's glands; but it may also proceed from extreme debility, manifested especially in the organic nervous system, and by the bloodless state of the digestive canal found after death. Hysteria, hypochondriasis, asthma, flatulent and lead colic, rabidity, and other affections, are characterised by great accumulations of air in the intestines, without any sign of vascular irritation of the villous surface. These gaseous collections are generally greatest in the large intestines; but they also take place in the stomach and small intestines, particularly in the latter, as observed in the last stages of typhoid fevers, and of various other acute diseases. The meteorismus of fever has been imputed by BROUSSAIS to disease, especially ulceration of the intestines; but, although the connection is frequent, it is by no means general, and, even when observed, both pathological states are merely associated effects of the same anterior change, viz. diminished vital power, expressed particularly in the organic nervous system and viscera influenced by it. The formation of air in the digestive canal has been chiefly attributed, in the article on COLIC, to exhalation from the villous surface. It may also arise partly from the chemical reaction of the diversified and heterogeneous substances taken into the stomach, as they are acted upon by the secretions and are propelled along the canal, and a portion is commonly swallowed with the ingesta.

45. (b) *The fluids and secretions foreign to the digestive canal in health*, but which are sometimes found in it, are, blood, pus, coagulable lymph, melanotic matter, tubercular matter, concrete or fluid fatty matter, a thick albuminous substance, calculous concretions, and worms. — *a.* *Blood* is occasionally found in the stomach and intestines, both in a fluid and coagulated state, and in very variable quantity. The causes of its effusion on the free surface of the villous coat are — 1st, Atony of the extreme vessels, and diminished vital cohesion of the coat; — 2d, A mechanical obstacle to the return of the blood, particularly in the vena porta; — 3d, Inflammation or irritation of the villous membrane in various states of intensity and morbid association, supervening either spontaneously, or caused by irritating ingesta; — 4th, A morbid or dissolved state of the blood itself, most frequently, however, associated with the 1st state, as in scurvy, the black vomit of yellow fever, and purpura hæmorrhagica; — 5th, The erosion of the coats of a blood-vessel in the seat of an ulcer; — 6th, Disease of the coats of a blood-vessel, independently of any lesion of the villous coat; — and 7th, from having been swallowed, as in cases of excessive hæmoptysis, hæmorrhage from the fauces, &c. When the sanguineous effusion proceeds from the *third* source, it may be either very slight, the mucus covering the villous surface being merely tinged with it, or very considerable, according to the various concomitant circumstances under which it may take place. Its *fifth* and *sixth* sources are the most rare, but not so rare as M. ANDRAL supposes, the sixth being entirely overlooked by him. M. PROSR,

Dr. ABERCROMBIE, and others, have detailed instances of the former; and a case of the latter, from atheromatous deposit in the coats of an arterial vessel disposing it to rupture, very recently occurred in my own practice. (See HÆMORRHAGE — *from the Digestive Canal*.)

46. *β.* *Puriform matter* is but rarely met with on the villous surface, instead of the mucus usually secreted by it, in any appreciable quantity. It is much more commonly found in the follicles, either in an inflamed state of this coat, or independently of any marked injection of its vessels. When the follicles contain this fluid, they generally present the appearances already described (§22. c., 36. e.), especially the conoidal and pustular state, the puriform matter escaping on incising them. — *γ.* Dr. MONRO describes a *brown fluid* like cocoa, which he has seen in some instances voided in large quantity during life from the stomach. In a fatal case, this viscus was very large, and half filled with this fluid, its coats and adjoining viscera being sound. — *δ.* *Coagulable lymph*, in various grades of density, and in the form of false membranes, is also sometimes found on the gastro-intestinal villous surface; but not so often as in the mouth, pharynx, and œsophagus. I have observed it most frequently in the form of whitish flocculent or thin membranous-like patches and shreds, covering the inflamed or partially injected surface, in fatal cases of scarlet fever, with gastro-intestinal symptoms. In sub-acute inflammatory affections of the digestive organs, either with or without diarrhoea or dysentery, as in the cases described by BAILLIE, POWELL, GOOD, ANNESLEY, LELUT, BILLARD, &c., the false membrane is occasionally so complete as to form a tube of various dimensions, which, when evacuated with the stools, has been mistaken for a sphacelated portion of intestine, or for its mucous coat. Dr. GODMAN found it covering the whole villous surface of the stomach; and Mr. HOWSHIP remarked a similar production in a child that had accidentally swallowed boiling water. M. ANDRAL thinks that it may sometimes proceed from a morbid secretion of the mucous follicles; but, as in the other situations in which it is seen, it evidently arises from inflammatory action of the villous or mucous coat itself, the exhalant vessels of which, in the inflamed state, throw out coagulable lymph instead of their usual watery or serous exhalation; these vessels also sometimes secreting puriform matter, in a modified form of disease. — *ε.* The gastro-intestinal mucous coat sometimes exudes a *black matter*, the *melanosis* of modern writers. This substance exists either in a fluid form, on the free surface of the membrane, or combined with its tissue, or in both forms in the same or different parts of the canal. When merely deposited on the free surface of this coat, it can generally be washed off; the matter composing it staining linen. But when it is infiltrated or combined with this tunic, it cannot be removed by ablution, and it does not stain linen. It is most apparent at the bottom of the lacunæ in the duodenum, or in the summits of the villi, or in the margins of the orifices of PEYER's glands, or in the bottoms of small ulcers. — *ζ.* *Tuberculous matter* is sometimes found in the follicles, the intestines being studded with a number of small white bodies, seldom exceed-



ing the bulk of a pea. The substance they contain is concrete, whitish, and friable. M. ANDRAL remarks that these tumours are merely the follicles altered in their nutrition and secretion; the affection being a genuine *acne* of the mucous membrane.—*η. Fatty matter* is very rarely met with in the intestinal canal; but several cases are recorded in which it has been passed in a fluid and concrete state during the advanced stages of chronic diseases.—*θ. A thick albuminous matter* is generally found covering the villous surface of the small and large intestines of those who die early in the *Pestilential Cholera*. (See art. PESTILENCE.) Of Calculous CONCRETIONS and WORMS in the digestive canal, a detailed account is given in their respective articles.

47. *B. Morbid productions in the tissues composing the parietes of the digestive canal.*—*a. Blood* is sometimes effused in the sub-mucous cellular tissue to an extent varying from a line to some inches, often without any change in the mucous membrane, and generally from the same causes as have produced its effusion within the canal (§ 45.)—*b. Serous infiltration, or œdema*, of the cellular tissue connecting the different tunics and muscular fasciculi with each other, is sometimes observed in various degrees, the thickness of the parietes being thereby proportionately increased. The fluid occasionally raises up the villous surface in the form of blisters or small vesicles. *Edema* is most frequent in the large intestines, the villous membrane being remarkably pale, or more or less injected and variously coloured, or softer than natural, or even more consistent, or ulcerated, either independently of disease of its follicles, or in the seat of PEYER'S glands, and with enlargement of them. The cellular tissue itself, the seat of serous infiltration, may be unaltered or softened, or hypertrophied, thickened, and indurated. In the latter case, it is, in some places, dry, and grates under the scalpel, without yielding any fluid; and in others, there are considerable deposits of serum, or of a gelatinous fluid of various consistency, constituting one of the more frequent states of what is usually called *scirrhus*, as met with in the pylorus or cardia of the stomach, or in the rectum. *Edema*, in the different forms now enumerated, is often the chief lesion observed after chronic diarrhœa and dysentery, and prolonged affections of the stomach. The exhalation of serum may also occur within serous envelopes or *cysts*, developed between the villous and muscular coats, and varying from the size of a pea to that of an egg.—*c. Gaseous exhalations* may take place between the coats of the digestive tube, soon after death, from incipient decomposition; but a case observed by M. J. CLOQUET (*Bullet. de la Faculté de Méd.* vol. vii. p. 267.) shows that it may also supervene during life.—*d. The secretion of fat* has been observed in one instance by M. ANDRAL in the sub-mucous cellular tissue, the coats of the small intestine, in which it formed a small tumour, being quite sound.—*e. Purulent matter* is seldom found in the substance of the gastro-intestinal tissues, and then only in small quantity in the sub-mucous and connecting cellular substance—forming either one or more collections, which are generally encysted, but also infiltrated in this tissue. These small abscesses should not be confounded

with the pustular-like tumours, containing pus, formed by inflamed follicles. They do not appear to give rise to any peculiar symptom.—*f. Tubercular matter* is secreted more frequently than pus in the gastro-intestinal parietes, particularly in the lower part of the small intestine, and generally in the cellular tissue connecting the coats. It forms small whitish tumours, owing to the colour and form of the deposition being perceptible through the elevated villous or peritoneal membrane, varying from the size of a millet seed to that of a pea. They may be very few or numerous—usually the latter in persons who have had tubercles in the lungs, particularly at the margins and bottoms of ulcers. They may exist long without giving rise to any symptom referrible to the digestive organs, until the mucous membrane becomes affected, when diarrhœa—generally chronic and intermittent—is the usual result. The membrane over and around these tubercles may be unaltered, or injected and inflamed, variously coloured, softened, ulcerated, &c. The softening and breaking down of the tubercular matter, and the attendant ulceration, may also terminate in perforation, as in the case published by M. LEGALLOIS.—*g. Melanoid matter* is occasionally deposited in the cellular tissue connecting the coats, either in a diffused or disseminated state, or in isolated spots, forming small projecting tumours.—*h. Osseous matter* is very rarely deposited in any part of the gastro-intestinal canal. DE HAEN (*Rat. Med.* vol. iv. cap. i.), however, met with it in the stomach; and SHORT (*Edin. Med. Essays*, vol. iv. p. 353.), in the colon and rectum.

48. iv. COMPLICATED PRODUCTIONS GENERALLY THE ADVANCED STAGES OF MORBID NUTRITION AND SECRETION CONJOINED.—The morbid formations now to be mentioned, are chiefly the advanced stages of two or more of the morbid changes already described; and, as might be inferred *à priori*, so nearly approximate to each other in their external characters, as well as in their anatomical and chemical elements, as often to render it a matter of difficulty to distinguish between them, unless in an arbitrary manner. From this gradual approximation of the appearances of organic lesions to one another has arisen the difficulty of describing and arranging them; and from attempts at both having been made without being aware of this circumstance, or adverting to it sufficiently, or from endeavouring to establish, in respect of morbid changes, that which has been successfully performed in regard of the living productions of nature, and of which the former does not, but the latter does admit,—from describing as unvarying species what is merely constantly changing varieties,—has arisen much confusion and misconception.

49. *A. Local or partial hypertrophy* of the villous membrane, forming the excrescences already noticed (§ 27.), seems to be an early stage of several changes, which have been variously denominated, according to the appearances they have presented, and which have evidently arisen from alterations of their nutrition, and interstitial secretion, probably occasioned, as well as modified, by local irritation, constitutional vice, temperament, diathesis, age, and vital endowment.—(*a*) The simplest of these productions seem to be the *polypous* or *fleshy* mass, which may assume either a



pyriform, oval, or spheroidal form; with a broad or narrow base, and an opaque, dark red or purplish colour, and various grades of consistency, and of vascularity chiefly as respects its venous circulation. It has been found in the stomach by MORGAGNI, MONRO, GRANVILLE, and others; and in the intestines by RHODIUS, PORTAL, MONRO, &c.; and has been seen as large as the closed hand. After repeated irritation, it may either throw out much blood, or may experience a sloughing or destructive form of ulceration.—(b) Other modifications of polypous tumours present a lobulated, irregular, or fissured surface, with a more decidedly *fungous* appearance and spongy structure than the foregoing, particularly in the old and debilitated. They are commonly dark-coloured, abound more with varicose-like veins, are less homogeneous internally, are more cellular, spongy, and vascular, and contain a dark serous or sanious fluid in their areolæ or minute cavities. They also bleed more frequently and profusely than the preceding, and discharge a foetid and sanious matter; and, when they ulcerate, assume the form of a soft fungous mass. They have been mistaken for *fungus hæmatodes*, but, although they very closely resemble the hæmatoid form of it, they differ from it in occurring primarily in the digestive canal, and not simultaneously in other parts, in being more spongy than it, and in containing little or no albuminous or brain-like substance.—(c) A third modification of these polypous productions has been described by Dr. MONRO under the name of *milt-like tumour*. It approaches in appearance that variety of *fungus hæmatodes* which has been denominated *encephaloid*, from its brain-like structure. The milt-like formation resembles in colour and consistence the milt of some fishes, extends to a large size, and is very slow in its growth. It is externally of a pale red colour, with an irregular surface, emits an offensive foetor, and is covered by a fine membrane, in which a number of injected vessels are ramified. It has a homogeneous structure, consisting chiefly of a whitish albuminous secretion deposited in the texture, or under the epithelium, of the villous membrane; and is imperfectly organised. It is partly miscible with water, and is somewhat hardened by spirits; the surface to which it is attached, and the adjoining parts, being discoloured, vascular, abounding with large engorged veins, and, when it is removed, presenting a villous, honey-comb appearance, besmeared with drops of blood from the torn vessels. The neighbouring lymphatic glands generally participate in the disease, and are filled with a similar matter. This structure differs from the true *fungus hæmatodes* in being found only on the digestive mucous surfaces; the latter, in every situation. It is also not so firm and elastic, nor so dark-coloured and purplish, nor of so unequal a consistence in different parts, as that disease. Moreover, it is not liable to fungous ulceration, as the latter is; and while it occurs only in advanced life, the true hæmatoid or encephaloid disease is most common in early and middle age. It is met with most frequently in the stomach, and several cases of it are detailed in Dr. MONRO's instructive work.

50. B. The various states in which simple *scirrhus* or *scirrhus-carcinoma* presents itself in

the digestive canal have been here ascribed chiefly to hypertrophy of the *sub-villous cellular tissue*; and to the modifications of nutrition and secretion superinduced in it by long continued irritation, morbid diathesis, advancing age, and depressed vital power. In the simple states of *scirrhus*, the hypertrophy of the tissues to which it has been chiefly attributed (§ 30.) may be distinctly traced; the thickening and induration of the sub-villous cellular tissue amounting in many instances to a fibro-cartilaginous change. But in further advanced stages, or in states of the disease which are different from the commencement, a more complex lesion evidently obtains; two or more, and ultimately even all, the anatomical elements of the part being involved in this change. *Scirrhus-cancer* is most frequent in the pyloric extremity of the stomach, the cardia, the rectum, the sigmoid flexure of the colon; but it may occur in other parts of the stomach and small or large bowels; and has been described by MORGAGNI, BAILLIE, PINEL, HOWSHIP, MONRO, CHARDEL, ARMSTRONG, PALETTA, LOUIS, BAYLE, R. PRUS, CRUVEILHIER, and CRAIGIE. It appears commonly to commence in the sub-villous tissue; the mucous follicles, the villous tissue itself, the muscular coat, the blood-vessels, the lymphatics, the nerves, and lastly the serous coat, evincing sensible evidence of change. But, although the former of these are the first to manifest altered structure, there is every reason to infer that the morbid condition originates in the organic nerves of the part, their functions only being at first affected; and that lesions of circulation, secretion, and nutrition, more or less gradually result, and ultimately the organic changes which are found implicating the above anatomical elements.—(a) The *scirrhus* and *simpler state* of this change consists of a greyish white structure, sometimes inclining to yellow, interposed between the internal surface and the serous coat of the part, frequently with lighter coloured and denser fibres—in some cases approaching to the fibro-cartilaginous texture—running through it, and generally in a transverse direction to the axis of the canal. This change may be confined to the connecting cellular tissue (§ 30.), or be coeval with a similar change in, or progressively implicate, the mucous follicles, and the villous or muscular coats. Along with the circumscribed thickening and induration of the part, a contraction of its canal generally takes place; the villous coat or the mucous follicles of the more prominent places become ulcerated; and, either consecutively or simultaneously, the interior of the morbid structure is partially softened and disorganised. Subsequently to this, a phagedenic, and, in some cases, a fungous form of ulceration rapidly proceeds; death, however, frequently anticipates this change. In rare instances, this structure is much more soft, lardaceous or pasty, and indented by erosions; and is chiefly met with in the rectum. I have, however, seen it once in the pylorus.—

(b) In another variety, the *scirrhus-cancerous* structure consists of circumscribed and irregular or nodulated masses; and, in the opinion of MONRO and CRAIGIE, commences in the mucous follicles. Its internal structure varies, but generally consists of a hard fibrous-like structure or bands traversing a soft or pulpy substance, fre-



quently containing a gelatinous or ichorous fluid in minute cavities. (See CANCER.) At a more advanced stage it becomes softer, often in separate parts, and at last ulcerates, leaving cavities with hardened, scirrhus, and ulcerating sides. It is most frequently found obstructing the orifices of the stomach.—(c) Scirrhus-cancer of the digestive canal is not always limited, but sometimes extends to the adjoining parts; and it may attack distinct portions, or even other viscera, either simultaneously or consecutively. Generally the peritoneal coat is the last to be affected, and, when implicated, it resembles coarse parchment. The rugæ of the internal surface are generally thickened and indurated, or eroded and ulcerated in the centre, or studded with small hard tubercles. There are often fungous growths in the advanced stages, proceeding from the ulcerated surface, which has ragged, unequal, and retorted edges; the disease being then in an open or carcinomatous state. In some instances the adhesion precedes the ulcerative process; and thus life continues, though all the coats are destroyed, and the malady is extended to the adjoining parts. When adhesion has not taken place, the ulceration communicates with the cavity of the peritoneum. If the malady be situated so as to interrupt the passage through the canal, the parts above it generally become very much enlarged, at first thickened, but afterwards thinned, and ultimately either ulcerated, perforated, or ruptured. The thickness and hardness of the diseased part vary much. When it is seated in the cardia or the pylorus, it may extend to the diaphragm or duodenum respectively, and so on as to other parts. The lymphatic glands in the vicinity are usually enlarged and scirrhus. The progress of the malady is generally very slow; but in other cases it is more rapid.

51. *C. Medullary Sarcoma — Hæmatoid, or encephaloid disease*—may originate in any of the elementary tissues of the digestive canal. It also presents modifications, according as the encephaloid, or medullary, or the vascular structure predominates. But it differs from the fungous and scirrhus-cancerous maladies, in its more obvious connection from the commencement in constitutional vice, in the greater rapidity of its progress, in its belonging to early age, and in its simultaneous or consecutive occurrence in different and unconnected parts. Its colour varies remarkably: it being generally much lighter when the medullary or albuminous substance is greatest, and passing through every shade to a violet or purple, as it becomes more vascular, and consists more of convoluted and injected capillaries; and varicose-like and congested veins. It generally consists at first of a soft elastic and distinct tumour, without fluctuation, but occasionally of unequal firmness in different parts. In its progress it bursts, and a soft dark or purplish fungus, which bleeds profusely, rises from its centre, and rapidly increases. When divided, separate portions of it exhibit different colours and consistence,—some being as soft as brain, others as hard as the boiled white of egg, and others like cartilage,—and cavities of various sizes and forms, containing a bloody fluid. It experiences a fungous ulceration, and, as it extends, implicates or converts into its own form the tissues surrounding it. It

occurs more frequently in the stomach than in other parts of the canal; and when it obstructs the orifices of this viscus, occasions the further changes noticed with reference to the preceding lesion. (See HÆMATO-ENCEPHALOID DISEASE.)

## 52. v. CHANGES OF CAPACITY AND SITUATION.

—A. *Increased capacity* of the alimentary canal is usually partial only—in one of its compartments; and is often associated with, and, indeed, occasioned by, narrowing or constriction of a part immediately below it. General increase of capacity has, however, been observed in some cases of bulimia. The stomach and large bowels are most frequently thus altered; either of which may become so much enlarged as to occupy the greater part of the abdomen. Cases of this description have been observed by PLATER, MORGAGNI, HASENOEHL, HAMBERGER, FRANK, ANDERSON, STOERCK, SANDIFORT, myself, and others; and are usually attended by thickening, induration and constriction, or scirrhus-carcinoma of the pylorus, when the stomach is dilated; and of the rectum, when the colon is thus changed. M. ANDRAL found the duodenum as large as the stomach in a case where the commencement of the ilium was contracted. When a portion of the canal becomes constricted or obliterated, either from simple thickening, induration and ulceration, or from scirrhus or carcinomatous disease, the part above may be not only dilated and sacculated, but also attenuated or even ulcerated, or it may ultimately burst from the consequent fæculent and flatulent distension. Cases of this description have been recorded by GIRDLESTONE, BURRELL, ANNESLEY, and others. Instances of great dilatation of a part of the canal, without contraction of a part below it, are rare. M. ANDRAL, however, found the stomach excessively dilated in two cases, without any obstruction of the pylorus.

53. *B. Diminished capacity* also is generally a partial change, and seldom observed throughout the canal, excepting in a slight degree, after long fasting or death from starvation, or after an excessive or prolonged use of acids and astringents. The stomach has been found as narrow as an intestine after poisoning by acids, and sometimes after irritating substances; and the intestines contracted throughout from the same cause, and the protracted use of acids and powerful astringents. In cases of artificial anus, the portions of intestine below it, no longer receiving the matters transmitted along the canal, contract remarkably, their cavity being filled with mucus. Obliteration of the cavity of some part of the digestive tube may take place either partially or completely—1st, from *intrinsic causes*; and, 2d, from *extrinsic causes*, or changes external to it, but which alter or destroy the permeability of its canal. The *intrinsic causes* are—(a) hypertrophy, with induration of one or more of the tissues forming its parietes; (b) excrescences or polypous growth on its internal surface; (c) concretions, either calculous or fæcal, or a ball of worms; (d) constriction of the muscular coat in a circumscribed part. In this last form of constriction, which is not infrequently observed in fatal cases of dysentery, and of which several delineations are given by Mr. ANNESLEY in the work referred to, the adjoining portions of intestine are commonly distended by air; the internal surface of the constricted part being generally either injected, or ulcerated, or



otherwise altered in structure. The contraction observed about the middle of the stomach, unconnected with any change of the tissues, by WEPFER, MORGAGNI, DE HAEN, E. HOME, MONRO, NACQUART, and others, has been ascribed to spasmodic constriction; whilst some conceive that it exists very generally during congestion. SOEMMERRING imputes it to the pressure of the stays, as it has been noticed chiefly in females. The four specimens figured by MECKEL all occurred in this sex (*Tab. Anat. Path.* fasc. iii. tab. 20.). The most common intrinsic cause of permanent contraction or diminished capacity of a considerable part of the digestive canal is that first assigned,—hypertrophy, with induration, of some one or more of its coats, either with or without ulceration. Numerous cases illustrating this are on record. Dr. DRAKE found the stomach diminished to one third of its capacity, its coats being thickened threefold throughout; and instances of thickening, induration, ulceration, and contraction of large tracts of the intestinal canal—most frequently of the large bowels—have been recorded by HILL, GREENHOW, BURRELL, HOLMES, CARTER, BOUILLAUD, HOWSHIP, MONRO, and many of the writers referred to. Besides these, other instances of the various forms of intrinsic constriction, or contraction from organic change, occurring in the stomach, and in the small as well as the large intestines, are adduced by BARTHOLIN, BONET, WALTHER, HALLER, PORTAL, MICHAËLIS, MOLLINELLI, LOESECKE, MOLLISON, and several others, in places referred to in the Bibliography.

54. C. Intimately connected with muscular or spasmodic constriction of some part of the canal is the occurrence of *introsusception*; the contracted portion passing within the adjoining dilated part. A large proportion of introsusceptions takes place at the moment of dissolution, particularly in children, as justly remarked by CAMPER, MONRO, J. DAVIES, and others; at least, no symptom referrible to it had occurred during life. The usual results of this change both of capacity and position are strangulation of the retained portion of intestine, and obstruction or obliteration of the canal; with the symptoms of COLIC AND ILEUS (§ 39, 40.), and internal strangulation. In all introsusceptions, the villous coat is innermost; next, the two serous surfaces are in contact; and more externally still, the two villous surfaces are also in contact. This arrangement, as M. DANCE (*In Repert. d'Anat. et Path.* &c. t. i. p. 441.) has shown, should be recollected, as it explains how, in consequence of the constriction and inflammation of the introsuscepted portion, its serous surfaces, which are in close contact, adhere; and, owing to its consequent strangulation and sphacelation, the whole of it is sometimes detached and passed by stool, without any of the intestinal contents escaping into the peritoneum. Instances of this kind have occurred, and several are recorded in the works referred to. Introsusceptions are most frequent in the small intestines, several sometimes occurring in the same case. They may also take place in this situation to a small extent without any bad effect. A large portion—even the greater part of the small intestines—is in some instances invaginated in the cæcum and colon; and, in rarer instances, the cæcum itself, either with or without portions of the ilium and colon, may be introsuscepted into

the sigmoid flexure of the last (HEVINUS, MONRO, ANDRAL, DANCE, and myself).

55. The extent to which the intestinal canal may be thus invaginated is extremely various—from a few lines to many feet. The introsuscepted portion may even protrude more or less through the anus. Instances of this kind are recorded by the writers now mentioned, and by many others. When the invaginated part sphacelates, sloughs are thrown off, leaving perforations, through which the intestinal contents may pass into the peritoneum. But when, owing to the circumstance just explained, this part is separated, perfect adhesion of the parietes of the intestine at the point of separation taking place, the canal suffers no interruption of its continuity. In this case, the invaginated part is passed by stool. HEVINUS met with an instance in which twenty-three inches of the colon, and another in which twenty-eight inches of the ilium, were evacuated. CRUVEILHIER and ANDRAL saw twenty and thirty inches of small intestine, with a portion of mesentery, thus passed. Cases in which an opportunity occurred of examining the intestinal canal at a remote period from the separation of the invaginated part, are recorded by HEVINUS and DUMERIL. In that by M. DUMERIL, six inches of the jejunum and ilium had been detached. Upon examination after death, the two extremities of the intestines were perfectly united, their edges having been bevelled and exactly fitted to each other. They had contracted adhesions to the peritoneum at their junction, but the canal was not sensibly diminished even at the cicatrix.

56. D. The *extrinsic causes* of obliteration or strangulation of the digestive canal are numerous, and have been referred by M. ANDRAL to an irregular disposition, either of the peritoneum or of the intestinal canal itself.—1st, *Those depending upon the peritoneum* are—*a*. Perforation of the mesentery;—*β*. Perforation of the omentum;—*γ*. Strips of the omentum adhering to the abdominal parietes, and entangling a coil of intestine;—*δ*. Fræna extending like arches from a portion of intestine to some other organ, as from the uterus or ligamenta lata of the rectum (ESQUIROL)—or from a portion of intestine to the abdominal parietes—or from the omentum to a part of the abdomen—or from one of the abdominal viscera to another;—*ε*. The mesentery or omentum, involving a coil of intestine, when folded or rolled together.—2d. *The causes of strangulation seated in the tube itself* are—*a*. The compression of one portion of intestine by another, as a portion of the transverse colon situated between the vertebral column and the duodenum (M. GENDRIN, in *Arch. de Med.* b. viii. p. 494.);—*β*. The escape of an introsuscepted portion of intestine through a perforation or rupture in the containing part, the introsuscepted portion being strangulated by the margin of the perforation. (M. M. SOLON, in *Bullet. de la Soc. Méd. d'Emulation*, 1822.);—*γ*. Twisting of the appendix of the cæcum around a portion of the ilium, commonly owing to the unusual length of this part;—*δ*. Adhesions of the extremity of the appendix, so as to form an arch or ring, in which a portion of intestine may become entangled;—*ε*. The twisting of a diverticulum around either the part from which it is produced, or a coil of intestine;—*ζ*. Adhesions of the extremity of a diverticulum,



which may compress a portion of intestine over which it passes, or that portion to which it is attached. All these causes may, however, exist without giving rise to *internal strangulation*. But they more frequently produce it either slowly or suddenly. In the former instance, symptoms indicating a greater or less obstacle to the passage of the intestinal contents are generally complained of for weeks, months, or even years, before the signs of strangulation appear. In the latter case, no premonitory symptoms are observed.

57. *E.* The situation of parts of the digestive canal may be changed in several ways, which are referrible to two principal classes:—1st, Alterations of situation in respect of different parts of the tube, and of the related viscera, — or *internal displacements*; — 2d. Protrusions through some part of the abdominal parietes, — or *external displacements*. (*a*) Internal displacements arise from — *α*. obstruction; *β*. alterations of its calibre; and, *γ*. the impulsion or dragging of adjoining parts. The stomach is not infrequently partially displaced from some one of these causes, especially its pyloric extremity, and generally in consequence of scirrhus thickening and induration, or tumours developed in it or its vicinity. I have seen the scirrhus pylorus form a tumour below the umbilicus, — a circumstance which might have led to an incorrect diagnosis, if it had not been known occasionally to occur. This viscus may also be displaced by the dragging of the omentum in a large hernia, the pyloric extremity descending equally low from this cause, as in a case recorded by Dr. R. Lowis. The situation of the small intestines, *cæcum* and *colon*, is also frequently changed from the causes now stated. Alterations of this description in the two latter of these have been noticed in their respective articles. The second or external class of displacements belong to the province of the surgeon, the medical relations of the subject falling more appropriately under the articles DYSPŒA, in which diaphragmatic hernia is noticed, and PERITONEUM, where the diseases of the serous coat of the digestive tube are considered.

58. vi. CONGENITAL LESIONS OF DIMENSION AND SITUATION.—The gastro-intestinal canal has never been found wholly wanting, even in monstrous productions. Of the different parts which constitute it, that proved to be the first formed is never deficient. This is the extension of the vesicula umbilicalis into the intestinal canal, which, however, may be arrested in its formation before one or other extremity of the tube has been produced, thereby occasioning deficiency of a portion of either, or the imperforation of their outlets. With the various congenital faults of configuration, dimension, and situation, it is unnecessary to occupy my limits. A few only of the most important may be noticed.

59. *A.* The dimensions of the digestive canal may be lessened or increased, either throughout, or in parts only.—(*a*) The stomach has been found so small as not to exceed the diameter of the small intestine. The convolutions of the small intestines have been observed less numerous or nearly wanting, and the length of the canal from the cardiac orifice to the anus hardly equalling that of the individual. The *cæcum* has sometimes been so small as not to form a *cul-de-sac*, or it has been, as well as the appendix, altogether defi-

cient, the ilium opening directly into the colon.—(*b*) Increased dimensions of some part of the digestive canal are more common than the preceding. In infants and children, the stomach has been found of a remarkable size; and in some, the duodenum has been as large as the stomach. The *cæcum*, or its appendix, has also been very large. BRUGNONI and MECKEL (*Tab. Anat. Pathol.* fasc. iii. p. 23.) have adduced instances of two colons springing from a single *cæcum*, and reuniting at the rectum, in the case of the former; but terminating in *cul-de-sacs*, floating freely in the abdomen, in that of the latter. One part of the canal has been found greatly increased in size, whilst the other is diminished. M. CABROL found the stomach of a person so large as to fill the greater part of the abdominal cavity, and the small and great intestines together little longer than three feet.—(*c*) Appendices or *diverticula* are sometimes attached, like the fingers of a glove, to the side of the canal. M. ANDRAL states them to be most frequent on the jejunum and ilium, and MECKEL on the lowest third of the ilium; but they have been found on the duodenum and on the rectum (MORGAGNI).—Their cavities are continuous with that of the intestine, and they terminate in a *cul-de-sac*, which either floats loosely in the peritoneal cavity, or adheres to some adjoining part. Their length varies from a few lines to three or four inches. They may either fall short of, equal, or surpass, the diameter of the intestine whence they spring; and they form every angle with it. They vary in number from one, which is most common, to five or six in the same portion of intestine. Their terminations are rounded or pointed, and they sometimes present a series of dilatations and contractions. MECKEL saw one inserted into the navel, forming a kind of umbilico-intestinal canal. From this and other circumstances—particularly their being commonly found single, and on the lowest third of the ilium—he infers that *true* diverticula are the remains of the original intestine formed by the vesicula umbilicalis; and contends that, when they occur in any other situation, or when more than one exists in the same case, they are *false*, and consist merely of hernia of the villous through the muscular coat, or of some other change (*Ueber die Divertikel*, in REIL's *Archiv.* &c. b. ix. h. 3., et *Tab. Anat. Path.* fasc. iii. pl. 21.) They seem to dispose the adjoining portion of intestine to organic change, as well as to alterations of capacity, as in the cases recorded by Dr. FRANCIS and others.

60. *B.* The situation of the digestive tube, or of parts of it, is variously changed, either by original conformation, or by accident or disease. The congenital abnormal positions of the viscera are so numerous, and of so little importance in a practical point of view, that I shall not touch on them. The reader will find them described in the works of MECKEL and ANDRAL referred to in this article. Imperforations of the canal come not within the scope of the work.

61. As the same alterations of structure occur in all the parts constituting the digestive canal, although in different degrees of frequency, I have described them in a connected manner, in order to prevent the repetition that could not be avoided if they had been comprised in the articles on the INTESTINES, STOMACH, &c. But in these, and some other articles, I have detailed the symptoms



of those alterations, and the treatment they require, because the same lesions, seated in different parts of the canal, are attended by different phenomena, and claim modified means of cure; reference being made to the changes here described. Therefore, the diseases of the digestive canal should be also studied in the following articles, which contain most of what is known respecting them:—CÆCUM, COLIC AND ILEUS, COLON, CONCRETIONS, CONSTIPATION, DIARRHŒA, DUODENUM, DYSENTERY, FAUCES, FEVERS, INDIGESTION, INTESTINES, ŒSOPHAGUS, PERITONEUM, PHARYNX, RECTUM, STOMACH, WORMS, &c.

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## DISEASE—THE CAUSATION AND DOCTRINE OF.

—CLASSIF. GENERAL PATHOLOGY; *Ætiology and Pathogeny*.

1. I. PRELIMINARY REMARKS.—It is of great importance to the tyro in medicine to acquire general principles, derived from a careful and comprehensive investigation of disease, that may guide him in the practical course he has to pursue. Nor is it of less moment to the experienced to find inferences and doctrines calculated to serve as the basis of therapeutical indications deduced for him even from those phenomena

which have become familiar from frequent observation, or have appeared trivial when viewed in an imperfect or false light. It is by an intimate acquaintance with morbid actions, in respect of their origin, of their conditions at the time of observation, and of their tendencies, and by a knowledge of principles derived therefrom, that we are chiefly enabled to direct our course through those numerous difficulties which beset us in the practical discharge of our duties, when we are insufficiently aided by published authorities, or imperfectly guided by the results of personal observation. Even the most experienced will often find examples of disease in some one or other of the numerous combinations or successions it is constantly assuming, of which memory will not furnish sufficient examples, by the results of which he may be guided; and will frequently have to recur to those principles, both doctrinal and practical, which he had learnt from his predecessors, or had acquired for himself by analysing and recombining the numerous manifestations of morbid action which have been presented to his view. In endeavouring to supply what is not to be obtained in our medical literature—to satisfy a want which I know has been very generally felt—I have only to regret that my limits will preclude those details, which many might require, and will confine me chiefly to succinct statements, where vivid illustrations might be necessary, and therefore looked for. But some advantage will be derived from exhibiting an outline of the subject, in a methodic manner, filled up in its more essential parts with such touches and shades as may be necessary to truth of representation, and treated in separate articles where it assumes a practical interest. The origin of disease, and the numerous circumstances, which, existing either *intrinsically* or *extrinsically* in respect of the frame, modify disease in its progress, are amongst the most important topics to which the mind of the scientific practitioner can be directed; inasmuch as upon a due recognition of these, in their individual or joint operation, will depend the justness of our indications of cure, the appropriate employment of remedies, and consequently the success of our practice, and our own eminence.

2. i. *The intimate Relation of the Subject to the Doctrine of Life*.—In all speculations respecting the causes, the nature, and the removal of diseased actions, the body ought to be considered in relation—1st, to its organisation and mechanism; and, 2d, to the influence by which that mechanism is actuated: we should view it as presenting an assemblage of numerous and beautifully contrived parts, all displaying a wonderful and harmonious combination of phenomena,—the most perfect and the highest presented to us in the physical world. Some of the finest illustrations of mechanical adaptation and power, and of those principles of action to which the researches of the natural philosopher have been directed, are manifested in the human body. But these manifestations are subject to a finer and yet a more powerful principle than any which govern the operations of inanimate matter. The whole organised creation, especially the higher animals, and man in particular, display functions which inanimate substances cannot produce; and



although physical actions are observed in their most admirable conditions in the animal body, they are entirely subject to higher functions, to which the term *VITAL*, from their nature and object, has been applied. It is one of the chief characteristics of *life* that it is allied to matter, delicately and peculiarly combined, and differently constituted from inanimate matter, which is kept in a state of cohesion by means of the attraction subsisting between its particles, and which state its chemical affinities dispose it to preserve. Life allied with matter produces combinations entirely different from those, which the chemical affinities of the elementary particles dispose them to assume, and preserves these combinations in opposition to their physical tendencies as long as it continues thus associated. *Life*, then, as I have already contended, is a *superior power*; and this superiority is instantly shown by the readiness with which the elementary particles of that matter with which it is so intimately connected enter into different combinations and forms as soon as this principle is withdrawn. One, therefore, of the chief, although apparently one of the lowest and most generally diffused manifestations of life, is to preserve the textures, or the matter with which it is associated, in a state suitable to the performance of the various functions of the animal. But it also executes higher offices. By a series of beautiful processes, it changes substances foreign to the constitution of the animal to which it is allied, and at last assimilates them into the organised structures which it animates. Thus nutrition and growth are produced, and the decay of the organised body is prevented.

3. Life, in its intimate alliance with the structures of the body, gives rise to various manifestations, according to the peculiar organisation of each; these structures being the instruments of its influence, and the organs by which vital operations are performed. Thus the muscular fibre, endowed with life, displays contractile properties; the nervous fibriles manifest sensibility; the liver and kidneys perform their secreting functions; and so on as respects the various parts composing a perfect animal. The *healthy functions* of life form the study of the physiologist, whilst the description of the *organs* performing them belongs to the anatomist. It is with the *derangements* of both *functions* and *organs*, that the pathologist and practitioner are chiefly concerned. The knowledge of structure and healthy function is, however, the basis on which both the one and the other raise a superstructure of great public benefit. The duly instructed pathologist is enabled to comprehend the beautiful combination of physical principles evinced by the human body; and to understand how they are directed by, and made subservient to, life, whether in perpetuating its healthy duration, or in guarding it against agents threatening any of the functions and organs which it endows, or in removing derangements when actually produced. It is from an enlightened recognition of the operation of external agents on vital functions, of the relation subsisting between causes and their effects, and of the succession of morbid phenomena consequent on primary changes, either vital or organic, that the scientific practitioner is enabled to devise suitable plans and appropriate means of restoration to the healthy state. But, when contemplating the functions of

the living body, whether in health or in disease, he should not restrict his considerations either to the physical, or to the vital, phenomena which any particular organ or structure presents. He should recollect that the physical phenomena are under the direction of the vital power; and that this power, although influenced by mechanical or physical operations, is equally energetic in controlling these operations, as they are, in their turn, of controlling it. The pathologist must be aware that the study of the living frame in health, and more especially in disease, is the investigation of the numerous manifestations of life through the various organs and structures with which it is wonderfully and inexplicably associated. Of *life* itself we know nothing but through those manifestations, and thus it is through them only we can enquire respecting its conditions. Although we cannot demonstrate the intimate nature of vitality, and cannot show the peculiar ties which bind it to organisation, we can prove, by an accurate enquiry into the numerous phenomena exhibited by living bodies, and by the manner in which external agents modify these phenomena, as well as by the derangements evinced by particular organs and structures, that the connection is intimate, and that causes operating upon the one generally affect the other. This powerful influence of life over the functions of the organs with which animals are endowed, and the manner in which causes modify the conditions of this principle, whether acting immediately upon it, or through the medium of the organisation with which it is allied, are amongst the most important topics which interest the medical practitioner.

4. The *conditions* of life, as manifested in the functions either of a single organ, or of the frame generally, are liable to change, from *intrinsic* and *extrinsic* causes; and the resulting alterations modify the structures with which this principle is so intimately and mysteriously related. On the other hand, the states of the animal organs and textures are readily affected by agents acting directly upon their organisation; and these states of structure modify its vital manifestations, and, through them, the vital endowment of the body generally. From this mutual dependence—this reciprocative influence—it will appear that, as life can only be contemplated through the medium of an organised body, so the derangements of such a body cannot be accurately investigated, and the conditions of life—its manifestations in appropriate systems and organs—be left out of consideration.

5. ii. *Health and Disease defined.*—Whilst the energy of the vital endowment is uninjured, and its manifestations in the various systems are in due harmony throughout, and with the state of the structures with which it is associated, all the operations of the body are duly and steadily performed. This is the condition which may be termed *health*. But as soon as the energies of the vital principle become depressed, excited, exhausted, or otherwise altered, either throughout the body, or in any of the systems or organs by which it is manifested, and when change from the natural condition is primarily produced in any of the structures with which it is associated, *disease* supervenes. This aberration from



the natural condition of the vital energies endowing the whole, or parts of the frame, or alteration of the textures which these energies actuate, is produced by causes acting sometimes singly, occasionally in combination, and frequently in succession. To point out the nature and modes of operation of those causes upon the living body, as far as their natures and effects are known, is the object here proposed.

6. A knowledge of the causes inducing those changes; the nature of the changes produced, as respects either the vital manifestations, or the structural alterations; the signs or phenomena by which morbid conditions of vital function or of structure are recognised; are the chief topics which interest the pathologist; whilst the means of removing those disorders, of averting death, and of alleviating the sufferings which they occasion, when cure is beyond the reach of our science, are the ends which he proposes to himself as the reward of his investigations. In order that all that is advanced respecting the various kinds and states of disease may be more clearly understood, I propose to give, in this, and some articles that will be referred to, a sketch of pathological principles; so that, by pursuing the plan pointed out in the preface, the knowledge which the tyro or the inexperienced reader will have acquired from this part of his systematic course of study, will become serviceable to him in the acquisition of that which should be afterwards brought before him. By considering what is simplest and most elementary, and proceeding onwards to what is more complicated and difficult, the mind will be gradually enabled to understand the abstract subjects which will come before it; the knowledge successively acquired introducing it to an acquaintance with what will follow. Before treating of the principal states or alterations from the healthy condition of the frame, which constitute the disease, I shall point out, *first*, the causes which act upon the living body most frequently in an injurious manner; *secondly*, the morbid conditions themselves which these causes induce; and, *thirdly*, enquire (in a distinct article) into the symptoms by which the nature of these conditions are recognised. Hence, *disease* will appear as a series of changes resulting from causes, between which and their effects there is a most intimate, although not always an obvious, relation.

## 7. II. CAUSATION OF DISEASE, OR ÆTIOLOGY; from αἰτία, cause, and λόγος, a discourse.

*Causes act primarily on the vital endowment.*

—I have already stated, that although the various textures and organs of the body display the finest combinations of mechanism, and the most beautiful principles of action presented by the physical world, yet they are entirely under the dominion of life, by which only they are actuated, and on which they entirely depend for the functions they present. It is not upon the textures or organs themselves that the causes of disease generally make their first impression; and even when they are brought in immediate relation to a particular organ or structure of the body, we have no evidence to furnish that they derange these parts by primarily affecting the machinery of which they are composed; but, on the contrary, from the gradual manner in which derangement is produced, from the nature and

effects of the disorder which follows, and numerous other considerations, it may be inferred that they make their first impression upon the vital endowment of the organ, disordering the functions which it performs under the dominion of life; and the functional disorder either leads on to the production of further disease, or indirectly to a return to the healthy condition. No doubt, some causes affect at once the organisation of the part, such as many chemical, physical, and mechanical agents; but the majority modifies the vital manifestations of the frame, either in one organ or structure, or in several simultaneously; and by impeding or modifying, deranging or altogether changing these manifestations, thereby induces effects, which become themselves causes of further disease, until life itself is terminated, or a healthy condition of function re-established. Of the justness of this inference satisfactory evidence will be furnished in the sequel. (See § 63., *et seq.*)

8. The causes of disease have been variously arranged and named by pathologists. For the better understanding the subject, and writers on disease, the different arrangements and distinctions which this subject has received may be briefly alluded to. *Causes* have been denominated *external* or *extrinsic*, and *internal* or *intrinsic*, according as they operate upon the body from without or within. They have also been called *principal* and *accessory* or *concurrent*; disease proceeding chiefly from the former with the assistance of the latter. They have also been named *positive* and *negative*, from the manner in which they act upon the body; and by some they have been divided into *physical*, *chemical*, and *physiological*, according to their nature. The division, however, which has been most generally adopted is into *remote* and *proximate* or *immediate*, according to their relation to the disease occasioned by them: the remote being the first in the chain of causation, the proximate or immediate those early changes which they effect in the œconomy, and which constitute the primary condition of the disease, or, in other words, the pathological states arising directly from the operation of the remote agents. The *REMOTE* causes have been divided into *predisposing* and *exciting* or *occasional* causes; the predisposing being those which influence the conditions of the living functions so as to favour the operation of those occasional or exciting causes whence disease more directly springs. To these two classes I would add a third, viz. *determining* or *consecutive* causes, which, being posterior to the others in point of time, determine or call into action the exciting causes, or rather come in aid of, and follow up, the impression made by the latter; and which, without such aid, might have been insufficient to produce actual disease, or would have induced it only in a slight degree.

9. It must be obvious that all causes, as well as the effects they produce, must have an intimate relation to the condition of the living frame; and that those which may be quite inefficient on one person will be powerfully active on another; or which are without effect on an individual at one season, will be very influential at another, owing to the state of vital energy at the time, to the concurrence of other causes, or to exposure soon afterwards to such as will de-



termine, or otherwise aid, those which preceded it, and which, although the principal or exciting causes, were insufficient, until thus reinforced, fully to produce the disease. Owing, also, to the condition of the frame, no effect will sometimes follow one, two, or even three exciting causes; and until a greater number are brought into operation, no mischief will often result. The effects produced by various animal and vegetable exhalations on different individuals, or upon the same person at distinct periods, under different states of mind and predisposition; and by the action of numerous concurrent, accessory, and determining causes; fully illustrate this position. It is chiefly owing to a want of knowledge of the doctrine of causation, that so much error and difference of opinion prevail respecting infectious and non-infectious diseases. On the other hand, persons may be so very easily affected, that causes of the slightest nature, and such as are determining or accessory in the majority of cases, are *principal* in respect of them; and influences which are usually *predisposing* are often, in such persons, the exciting causes of disease. Also those which are *remote* in their operation on some constitutions, are *direct* or *immediate* in respect of others. Examples of this are found in the diseases of the lungs, liver, stomach, and bowels. In considering the agents which affect either the functions, or the organisation, I shall first notice those which generally *predispose* the system to disease; next those which *excite* disease in a direct or immediate manner; afterwards such as are specific, or produce determinate results; the effects of their operation on the living frame being obvious, and often admitting of being foreseen; and lastly those circumstances which sometimes determine, reinforce, or call into action, exciting or specific agents.

10. i. OF THE PREDISPOSING CAUSES OF DISEASE.—These may be classed—1st, into such as are proper or peculiar to individuals, and the circumstances in which they are placed; 2d, into such as are not proper or peculiar to individuals, but which may affect various persons, and even numbers of persons, but individually and occasionally; and, 3d, into such as are general, and affect more or less all who are exposed to them. — *A. Those which are peculiar to the individual*, and to the circumstance in which he is placed, and which may be called the individual predisposing causes, are—1st, original conformation and hereditary predisposition, age, sex; temperaments, original and acquired; habit and constitution; trades, professions, and circumstances of life, &c.; and, 2d, the various external and internal agents, and circumstances modifying the state of the functions,—as previous functional disorder, and convalescence from disease; and the pregnant and puerperal states.

11. *a. Original conformation and hereditary predisposition.*—It is generally observed, that the constitutions, temperaments, and diathesis of the offspring closely resemble the parent; and that whatever disposition to disorder, whether of function or of structure, the latter may have possessed, is liable to evince itself in the former. From this circumstance having been very generally remarked in respect of certain maladies, they have been termed *hereditary*. But it must not be supposed that children are actually born

with the diseases of their parents. This is but seldom remarked; although, in rare instances, I have observed the commencement of tubercles in the lungs of a new-born infant by a consumptive mother; and small-pox and syphilis are sometimes communicated to the foetus *in utero*, occasioning in some instances its premature birth, and even its death, either previously to or about the natural termination of utero-gestation. Hydrocephalus, cataract, and various imperfections of the organ of hearing, and, indeed, of other organs of sense, are not infrequently congenital, or examples of disease from *original conformation*; but, in such cases, it is rare that the parent is similarly affected at the time, although the hereditary predisposition, as about to be explained, exists nevertheless; and, as respects the first of these, a tendency merely to the disease could have existed at an early age in the parents. It should be kept in recollection, therefore, that the foetus *in utero* may be affected by several cachectic, inflammatory, or even febrile diseases, *communicated* by the parents, or supervening *accidentally*: but, of those which are thus communicated, even the majority are not, properly speaking, hereditary; and those which are accidental do not depend upon the constitution of the parents, or the ailments experienced by the mother during the period of gestation. *Congenital diseases* are consequently divisible into—1st, Those which occur in the foetus, without any participation on the part of the parents,—as imperfect development of organs, inflammations, effusions of fluid in various parts, &c.; 2d, Diseases in which the foetus participates with the mother, owing to their contaminating influence, or their extension throughout her organisation,—as syphilis, small-pox, fevers, &c.; 3dly, Those that affect the foetus from a constitutional liability in one or both parents,—as hydrocephalus, cataract, tubercles, &c.

12. Most commonly, however, the child is born free from disease; but, inheriting the constitution and diathesis of the parent, has that condition of function and organisation which renders it more susceptible of impressions produced by the exciting causes of certain maladies. Examples of this may be contemplated daily in respect of diseases of the lungs and brain; the constitution and functions of these viscera disposing them or rendering them more prone to experience those derangements by which the parent or parents had been affected. In some instances this predisposition may be more strongly marked in the child than in the parent; and in other cases the predisposition may be extremely slight, and only brought to light by the operation of the more energetic agents.

13. The predisposition of the offspring generally evinces itself more strongly at certain ages than at others, according to the kind of morbid constitution or predisposition which it may inherit, the causes to which it is exposed, and the nature of the malady which results. Thus, the disposition to *hydrocephalus*, *convulsions*, *idiocy*, *ricketts*, *scrofula*, *cataract*, &c., is most apparent soon after birth, and at early epochs of life; to *epilepsy*, *hæmorrhage*, and *pulmonary consumption*, about the age of puberty, or previously, or soon after; to *gout*, *asthma*, and *angina pectoris*, in adult and mature age; to *insanity*, *apoplexy*, and



*paralysis*, during the mature or advanced stages of life; and to various nervous disorders, at more irregular periods. But these diseases do not necessarily supervene, although one or both parents have been affected by them; and several usually appear in alternate generations. Some occur more uniformly than others. When the predisposition to them is derived from only one parent, they very frequently never make their appearance, unless as the effect of very active exciting agents. But even when the predisposition is derived from both parents, and when it may be considered as being thereby heightened, exciting causes are generally required to develop the disorder.

14. *b. Age.*— Each of the different epochs of existence is more liable to certain diseases than to others. During the *earlier periods*, there is generally a predisposition to particular disorders, even when no hereditary taint exists. This is partly owing—(*a*) to the changes going on in the frame; (*b*) to the state of vital manifestation; and (*c*), to irritations in the alimentary canal. Amongst the changes proceeding in the frame, that either readily suffer derangement or lead to it, the most important are the processes of ossification and development of the contents of the cranium. These processes are more or less under the dominion of the vital influence; and they are more or less disturbed as this influence is affected, in respect either of the system generally, or of particular organs. Hence, rickets, hydrocephalus, inflammations of the brain or its membranes, readily occur. The quantity of blood sent to the brain in early life is another predisposing cause of cerebral affections; and the readiness with which the functions and even the circulation of the brain are disturbed by impressions from without or by irritations from within, becomes, especially when assisted by other causes, a frequent source of disease. (See AGE, § 10.; and DENTITION.)

15. After the first dentition, and during *growth*, the powers of life are energetic, as shown by the reaction of the vital functions upon the depressing causes of disease; and are eminently conservative, particularly in resisting hurtful agents. The predisposition is chiefly to inflammatory ailments and acute attacks of fever, especially in those who breathe a wholesome air and are sufficiently nourished. But the susceptibility to impressions, both moral and physical, is energetic; and irritations, from whatever cause, are generally followed by augmented vascular action, with which the whole frame, owing to the susceptibility of the nervous systems, promptly sympathises. Hence febrile attacks, eruptive fevers, inflammations, cerebral affections, disorders of the air passages, of the alimentary canal, and lymphatic glands, usually appear. At this period, also, all specific causes readily take effect, particularly of those diseases which are incidental to childhood; their full operation, however, destroying the susceptibility to be again affected by them. About the time of *puberty* and *adulthood* various complaints first show themselves, especially some that are inflammatory, and to which there is an hereditary tendency,—as pulmonary consumption, hæmorrhage from the lungs, epistaxis, plethora; and as soon as the body has ceased to grow in height, or the vessels to ex-

tend themselves in the direction of their axis, these disorders are still more readily produced by exciting causes. In *manhood* and *mature age*, the susceptibility to impressions gradually diminishes, and generally continues to decrease as age advances. During the former of these periods, hypochondriasis, melancholy, insanity, hæmorrhoidal affections, asthma, rheumatisms, and the majority of organic diseases, with the exception of such as are scrofulous, commonly make their appearance. Towards the *decline of life*, gout, softening of the brain, apoplexy, paralysis, scirrhus, cancer, changes in the coats of the blood-vessels, diseases of the organs of sense, affections of the urinary passages, &c. usually supervene. (See AGE, and CLIMACTERIC DECAY.)

16. *c. Sex.*— There are a great many diseases to which both *sexes* are equally liable. Fevers, inflammations, organic diseases, and many others, attack both. But it has been observed, during the prevalence of epidemics, and in unhealthy countries, that the female sex suffers much less than the male. This, no doubt, arises from the more regular habits of females, and their less exposure to the determining or concurring causes: something may also, perhaps, be attributed to their periodical discharges, which tend to diminish plethora and to purify the circulating fluid—circumstances calculated to impart a partial exemption from several diseases, particularly those which are epidemic and endemic, although they may dispose to others. But the conformation and temperament of females, the sympathy existing between their generative organs and the state of the circulation in the brain, the marked susceptibility of their nervous system, and great mobility of their muscular organs, dispose them—especially those in cities and populous towns—to diseases usually denominated nervous. The natural vicissitudes, also, of female life are accompanied with a tendency to particular maladies, especially the periods at which the menstrual discharge commences and ceases; at the former of which, nervous and cachectic complaints—at the latter, diseases of the organs of generation, or of those closely allied to them in function or situation—very frequently appear;—chorea, chlorosis, irregular convulsions, hysteric or painful affections, difficult, suppressed, or irregular catamenia, occurring about the former epoch; and chronic inflammations, scirrhus, cancer, and other organic lesions of the womb, disease of the breast, and disorders of the colon or rectum, about the latter period.

17. *d. Temperament and diathesis.*—The *sanguine* and *irritable* temperaments dispose to plethora, inflammations, hæmorrhages, pneumonia, and to inflammatory fevers. The *bilious* temperament most readily experiences biliary derangements, bilious fevers, affections of the stomach and bowels, hypochondriasis, mental disorder, chronic cutaneous eruptions, and various organic derangements of the abdominal viscera. Persons of the *lymphatic* or *phlegmatic* temperaments are predisposed to catarrhal attacks, slow fevers, chronic discharges, dropsies, scrofulous and scorbutic affections, diseases of the joints and glands, and to tuberculous and other chronic diseases. In persons thus constituted, the powers of life are languid, the preservative influence and vital resistance feeble, and reaction



upon noxious causes or agents seldom developed or energetic. The *nervous* temperament disposes chiefly to convulsive diseases, especially to hysteria in the female sex; to mania and insanity, or other derangements of the mental manifestations, as hypochondriasis, melancholia, &c.; to nervous and typhoid fevers, &c. This temperament often modifies the progress of various acute diseases, and imposes upon them a nervous character. When the temperaments are *mixed*, an accordant predisposition may often be remarked; as, in the *sanguineo-bilious*, a disposition to bilious inflammatory fevers, to hepatitis, to inflammations of the alimentary canal, of the brain, and of the serous surfaces, &c., is often manifested.

18. *e.* Of *constitution* and *habit* of body, it may be remarked, that a robust constitution generally successfully opposes the impressions of many exciting causes; but when once a morbid impression is produced, disease assumes a more active or acute character, and is attended with higher vascular action, the powers of life and reaction being great. On the other hand, weak constitutions, and those of a scrofulous taint, are more disposed to disorder, more readily affected by its causes upon the first impression; and disease in them assumes a more chronic and low form. When persons thus constituted have become habituated to the impression of certain morbid agents, they frequently cease to be affected by them in the usual manner; as observed in respect of marsh or terrestrial emanations, which seldom give rise to regular attacks of fever in such subjects, but induce organic disease, and sinking of the powers of life.

19. *f.* *Habits* of life and *profession* are amongst the most influential predisposing causes of disease. Whatever profession or occupation requires an active exertion of the powers of the mind, and continuation of that exertion to the neglect of sufficient relaxation and exercise, occasions determination of blood to the head, and favours the production of inflammation of the brain or of its membranes, especially if such persons live fully or luxuriously; and, if fever attack them, the head, the liver, and stomach become severely and dangerously affected; and, unless the disease be actively treated at its commencement, death may supervene in consequence of serous effusion from the membranes, or of softening of the texture of the brain, rupture of its vessels, or of organic change in the liver or digestive canal. Those who take *active exercise* in the open air are generally more disposed to inflammatory attacks of an acute character, to pneumonia, and to rheumatism, than to other complaints; although in them the predisposition to disease is much less than in other persons. Those who indulge the *appetites* beyond what the economy requires, — especially the desire for food, and for vinous and spirituous liquors, — are liable to disorders of the stomach, liver, and intestinal canal; and, if attacked by fevers, these organs generally are the most seriously affected: such indulgences also dispose to plethora, apoplexy, paralysis, gout, dropsy; and in many cases directly excite those maladies. Inordinate *sexual intercourse* is also a frequent predisposing cause of many diseases, and often immediately induces disorder. Pulmonary disease, affections of the heart, epilepsy, mania, and the other disordered

manifestations of mind, frequently take place in consequence of the predisposition to them generated in the system by the excessive indulgence of this appetite. It also leads to other maladies, by lowering the vital energies of the frame, and thereby rendering them more assailable by the common exciting causes of disease.

20. *g.* The *circumstances* of life in which persons are placed have a marked influence in favouring or counteracting the operation of exciting causes. It has been determined, by exact observations and calculations, that those who enjoy easy or comfortable circumstances are much less subject to disease than the poor, the insufficiently clothed, and ill-fed. This arises not only from the former class being less exposed to its exciting causes, but also from the good effects of sufficient nourishment in supporting the energies of life, and thereby warding off the impressions of injurious agents and influences. Much, also, is owing to personal and domestic cleanliness, to proper clothing, and to living in airy apartments in healthy localities. Yet, while full living thus wards off many diseases, especially those arising from debility, as low or adynamic fevers, scorbutic disorders, scrofula, dysentery, and various others, it disposes to gout, dyspeptic and nervous affections, particularly to apoplexy and paralysis. (See ARTS AND EMPLOYMENTS.)

21. *h.* *Debility, previous disorder, and convalescence from other diseases*, often favour the operation of exciting causes; particularly when the powers of life are much depressed or exhausted. In respect of the predisposition occasioned by already *existing* disorder, some doubt may be entertained by those who may have adopted the hastily formed and incorrect dogma that two disorders cannot co-exist in the economy. This may be true in respect of certain febrile diseases, especially those of a specific or exanthematous kind: but in nearly all beside, so very numerous are the exceptions, that the principle becomes quite untenable; and, in many cases, even an opposite doctrine may be enforced, particularly in respect of bilious and nervous disorders. Thus, when the functions of the stomach are weakened, or those of the liver obstructed, various affections of different organs related to these, either in function or anatomical connection, are apt to supervene, more especially febrile diseases, disorders of the bowels, brain, and lungs. The exhaustion of the powers of life partially continuing during *convalescence*, also disposes the frame to the invasion of the exciting causes. On this account, convalescence ought always to be watched by the ordinary medical attendant, who, if not allowed to continue his aid for this purpose, should state his reasons for proffering it; and, if it should be declined, the patient will then have himself only to blame. (See DEBILITY, &c.)

22. *i.* Amongst the other individual predisposing causes of disease, I may mention the *pregnant and puerperal states*, that favour, in a very marked manner, the occurrence of several maladies, which, owing to this connection, have been denominated puerperal, &c. Although these diseases arise chiefly from the predisposition created by the conditions of the female organs and constitution during these states, yet a great difference exists between them as to their necessary depend-



ence upon these conditions; for, whilst these states predispose to the invasion of exciting causes developing disease in all instances, the maladies that result may be either such as are peculiar to them, as adynamic puerperal fever, &c.; or such as are not necessarily dependent upon, although remarkably favoured by, them, as inflammations of the uterus and peritoneum, uterine hæmorrhage, convulsions, mania, &c. During the puerperal state, also, the predisposition to fevers, inflammations, consumption, various nervous affections, rheumatism, &c., although less strong than to the preceding, yet is greater at this period than at any other.

23. *B.* Amongst those predisposing causes which are not peculiar to the individual, but which affect persons individually and occasionally, certain states of the mind deserve the first place.—

(a) When the mental energies are depressed by grief, anxiety, disappointment, fear, &c., the powers of life are less able to oppose the debilitating causes of disease which invade them from without, and of which nature all the exciting causes of fevers, particularly those which are specific or contagious and miasmatic, generally partake in a most marked manner. On the other hand, when the mind is elevated by success, by hope, by confidence, and the other exciting passions, the depressing causes make little or no impression upon the constitution; and individuals thus circumstanced almost always escape from diseases which readily invade the fearful, the dejected, and the disappointed. There is, perhaps, no circumstance which more certainly disposes the system to the operation of the exciting causes of fever, than the fear of being attacked by it; whilst nothing fortifies the constitution more surely than a full confidence that the causes of disease will not take effect.

24. (b) Next in importance to mental depressions, is whatever lowers the vital energies, or exhausts and debilitates the body. Under this head, low diet, fatigue, previous illness, excessive secretions and discharges, want of sleep, and venereal excesses, may be classed. (See art. *DEBILITY*.)

25. (c) *Dress*, even, has a very evident influence in creating a predisposition to disease. Too little clothing, particularly in females, favours the occurrence of difficult and suppressed menstruation, pulmonary diseases, and disorders of the bowels. It was remarked, during the French revolution, when it was the fashion to dress classically,—which was almost a state of seminudity, and more appropriate to the warmer climates of Athens and Rome than to those of the north of France and this country,—that pulmonary diseases, rheumatism, suppressed menstruation, bowel complaints, catarrhs; and amongst the children, who were exposed with naked busts and thin clothing, croup and other diseases of the air-passages and lungs; were uncommonly prevalent. On the other hand, *too warm clothing* is a source of disease, sometimes even of the same diseases which originate in exposure to cold; and often renders the frame more susceptible of impressions of cold, especially of cold air taken into the lungs. The remarks now offered may be applied to overheated sitting and sleeping apartments, and to warm soft beds and bed-clothing. These relax and weaken the frame, dispose to disorders of the kidneys, urinary and sexual organs, and render the system much more

susceptible of injurious impressions from without. A predisposition is thus produced, not only to catarrhs, inflammations, affections of the lungs, and rheumatism, but to irregularity in the menstrual discharge. It has been remarked, that the females in Holland, who generally use very warm clothing, warm apartments, and warm beds, are very subject to excessive menstruation and fluor albus. Females, also, become disposed to various diseases, particularly those affecting the pulmonary organs and heart, from wearing very tight-laced and unyielding corsets. Indeed, those dressed in this manner can scarcely call the intercostal muscles into action, and can breathe only by means of the diaphragm. The mechanism of respiration being thus impeded, the requisite changes are not fully produced upon the circulating fluid; and congestion supervenes in the lungs, right side of the heart, and parts situated below the seat of pressure. This cause is especially injurious to females during growth and pregnancy; for the chest should be fully and freely expanded, especially at these periods, in order that the circulation through the lungs and heart may be unimpeded; and that the blood should experience those changes without interruption, that are required for the development of the body and of the foetus. The functions, not only of the lungs and heart, but of the liver, stomach, and bowels, are materially interrupted, and even these organs themselves are removed from their natural positions in respect of each other, by this cause. This is more remarkably the case as regards the colon, which, by the squeezing together of the hypochondria and lateral regions of the abdomen, is thrown into unnatural duplicatures; the passage of the fæcal matters along it being thereby impeded, and habitual costiveness, with all its consequences, produced.

26. (d) Amongst the most frequent predisposing causes to disease, is *intemperance in food and drink*. Too much and too great a variety, particularly of animal food, high-seasoned dishes and soups, rich sauces, the too liberal use of vinous, spirituous, or other exciting liquors, over-load, over-distend, and over-excite the stomach; dispose it, the liver, and bowels to inflammations and functional and organic disease; directly induce plethora; and, when this state is produced, inflammatory complaints in early life, and gout, apoplexy, paralysis, &c. at a more mature age, frequently follow. On the other hand, an unwholesome, poor, innutritious diet, or food of a fluid or watery consistence, predisposes to diseases of debility, by diminishing the powers of life, particularly in the digestive organs, and lessening the vital resistance to depressing causes. Typhoid or adynamic fevers, dysentery, cutaneous complaints, verminous diseases, tubercles, scrofula, scurvy, scorbutic dysentery, enlargements and affections of the joints, are common under such circumstances.

27. (e) *Excessive secretions and evacuations*, although in some instances a disease of themselves, frequently predispose to further disease. The abuse of remedies which have an evacuant operation, excessive perspiration, fluor albus, too long suckling, and venereal excesses, weaken the powers of life, and expose them to the invasion of exciting causes.



28. (f) *Indolence and too great exertion*, both predispose to, and occasion disease; whilst moderate exercise, especially in the open air, increases the energies of the frame. Fatigue generally favours the impression of causes which produce acute affections, as fevers and inflammations; whilst indolence and sedentary occupations dispose to chronic maladies, as congestions of the liver and abdominal organs, to corpulency, apoplexy, hæmorrhoidal affections, and derangements characterised by diminished tone of the nervous and vascular systems.

29. (g) *Sleep*.—The want of this restorer of the vital energies favours the invasion of fevers, inflammations of the brain, and disordered manifestations of mind; whilst too much sleep, and the horizontal posture too long retained, or too frequently assumed, predispose to apoplexy, paralysis, softening of the brain, inflammation of the cerebrum or of its coverings, and affections of the kidneys. Many, also, of the causes of acute diseases make their impression during sleep, when the body is relaxed, and thereby exposed to their invasion. On the other hand, early rising promotes both mental and corporeal energy. It has been remarked by the actuaries of Life Insurance Companies, that early rising is, of all habits, the most conducive to longevity; all long lived being early risers.

30. (h) Due regulation of the temper, the passions, and desires, and a proper conduct of the imagination, are also necessary to resist exciting causes. Indulgence of temper and passion not only predispose to disease, but also frequently directly excite it, particularly in nervous, irritable, and sanguine temperaments. Diseases of the heart, brain, liver, stomach, and bowels, often originate in these sources. Uncontrolled passions of every description occasion numerous functional and structural changes, seated chiefly in the viscera of the large cavities. Moderation in eating and drinking, in sleep, in the indulgence of those appetites, feelings, passions, and desires which have been implanted in our natures by a wise Providence for our advantage, gratification, social improvement, and happiness; an equable state of the mind, with confidence in our powers; and the pleasant excitement accompanying a well-regulated course of application to business or study; are the best means of resisting the impressions of injurious agents.

31. C. *General predisposing Causes*.—Of these, the most universal in their operation are certain constitutions of the atmosphere. Besides the variations in the temperature and dryness of the air, its *electrical conditions* also vary extremely; but as yet we are not possessed of sufficient data to enable us to state with precision how far these conditions may predispose to, or directly excite, disease, or what particular change in our bodies result from certain electrical states of the atmosphere. But that the electrical conditions, together with a more or less humid state of the air, are connected, in the relation of cause and effect, with the prevalence of disease, is extremely probable, although not satisfactorily demonstrated. Those conditions which predispose to disease are—1st, temperature; 2d, humidity; 3d, these two states conjoined; and, 4th, electrical conditions of this fluid. Two very important subjects, very intimately allied to these, and which act both as

predisposing, exciting, and specific causes, viz. ENDEMIC and EPIDEMIC influences, are considered in separate articles.

32. (a) *Temperature* has a considerable influence in generating a predisposition to certain diseases. Thus, in low states of atmospheric temperature, the functions of respiration are fully and actively performed, especially as respects the blood; and the diseases observed in such circumstances are of an inflammatory nature, are seated chiefly in the respiratory organs, and are characterised, unless when the reduction of temperature is remarkably great, or the air very moist, by reaction of the powers of life on the causes which excite them. Very warm states of the air impede the changes which the blood undergoes in the lungs; and, by thereby furnishing abundant materials for the formation of bile, occasion an increased secretion of this fluid. Hence bilious diseases are most prevalent during high atmospheric temperature. This effect upon the blood is still more marked, if warmth be conjoined with moisture (§ 34.). Under those circumstances, bilious fevers, hepatic diseases, dysentery, diarrhoea, and cholera prevail.

33. (b) *Moisture*.—In dry states of the air, changes are fully effected on the blood by respiration; its watery portions are more freely carried off from the exhaling surfaces; its purity is increased, its congestion and excessive fulness prevented; and, consequently, the vital energies are promoted; and the depressing causes of disease, as infectious animal effluvia, and terrestrial exhalations, make much less impression on the system. Disorders occurring in this state of air assume chiefly a phlogistic or sthenic character, and affect most frequently the organs of respiration and the nervous system. A very moist state of atmosphere causes opposite effects. It fails of producing to the full extent the requisite changes in the blood, and of carrying off the fluids exhaled from the surfaces, especially of the lungs; thereby rendering the powers of life more languid, and the system consequently more open to the invasion of the exciting causes. Less moisture, also, being exhaled, the elements of biliary secretion, and the watery portion of the blood, become redundant in the vascular system. Hence an abundant secretion of bile, fevers, affections of the liver, and determination of fluids to the intestinal canal, &c. are promoted. (See art. CLIMATE.)

34. (c) *Temperature and moisture conjoined*.—That warm and humid states of air are individually active as predisponents of disorder, has been shown; but it is when they are conjoined, that they are especially injurious. A warm and humid atmosphere dissolves and accumulates the specific causes, such as animal and vegetable effluvia; assists their operation; and favours a rapid transfer of electricity from the earth's surface, and the change in the condition and the accumulation of it in the air resulting therefrom. It has been shown by the experiments of PROUT, FYFFE, ALLEN, and PERYS, in an artificially increased temperature, and by those I made in an intertropical atmosphere, that heat remarkably diminishes the changes effected by respiration on the blood; and these changes are further diminished by warmth associated with moisture, which, moreover, promotes the passage of positive electricity from the body. And as the researches of RITTER show that the



electricity of the positive pole heightens, whilst that of the negative depresses, the actions of life, the ultimate effect of humid atmospheric warmth, as respects both the state of the circulating fluid and the locomotive electricity of the body, will be to lower the whole circle of vital manifestations, and to dispose to, or even to induce, diseases of a low character—to occasion adynamic, continued, and remittent fevers, or agues of a pernicious and congestive kind, or dysentery, cholera, chronic asthma, diarrhoea, and affections of the liver and spleen. A moist and warm air may, therefore, be stated to be doubly injurious, inasmuch as it is of itself an extremely active predisposing and exciting cause, and as it is the means of dissolving vegetable and animal miasms,—of marsh, infectious, and pestiferous emanations,—and the vehicle or medium in which they act injuriously on the frame.

35. (d) *A moderately cold and a dry air* increases the respiratory actions, and the energies of the system; proving what is commonly called a bracing atmosphere. Diseases usually assume an acute, sthenic, or phlogistic form; and the respiratory organs are liable to suffer.—In *cold and moist* states of air, rheumatism, gout, nervous affections, scrofula, and glandular diseases, intermittent and adynamic fevers, erysipelas, dropsies, anasarca, and chronic disorders and congestions, often prevail, especially in low, ill-ventilated, and marshy places. The positive electricity being rapidly carried off by induction from the body, a salutary stimulus, and one which experiments have shown to be productive of increased activity of all the animal functions, may be supposed to be lost. But when the air is very dry, the transit of electricity from the surface of the earth and from the body is impeded; this fluid accumulating until a moister state of air diminishes its quantity, and changes the relation subsisting between the electrical condition of the frame and that of the atmosphere. In very *dry and warm* states of air diseases less frequently prevail than when it is both warm and moist; and are more frequently characterised by increased vascular action. Inflammatory fevers, inflammations of the brain, liver, and stomach, are then most prevalent.

36. (e) *Sol-lunar influence*.—Considerable importance has been attached to the influence of the *sun* and *moon* in creating a morbid predisposition. Close observation of the relation subsisting between the prevalence of fever and dysentery, and the full and change of the moon, has apparently established some degree of connection between them in warm climates, particularly in the eastern hemisphere; but the manner of explaining this circumstance has been by no means satisfactory. Some impute it to a direct lunar influence; and adduce in support of their opinion the fact, that dead animal matter, when exposed to the moon's rays, more speedily suffers decomposition than when protected from them. Others, who favour sol-lunar influence, argue that it proceeds from the height of the tides, at full and change of the moon, occasioning the rivers on the coasts to inundate their banks, and to deposit vegeto-animal matter, which is rapidly decomposed, when the water retires and leaves the low ground exposed to the sun's influence. But if the relation subsisting between the preva-

lence of disease, and the moon's changes, were owing to this circumstance, it could hold only in respect of parts situated in the low alluvial countries on the coast, and not in districts inland and much elevated above the level of the sea. This, however, is not the case; for observation has shown the influence, whatever it may be, to be as powerful in high and inland countries as in districts on the sea-shore.

37. (f) *Light and sunshine*.—That the power of the *sun's* direct and refracted rays, in the production and removal of disease, is by no means inconsiderable, is proved by their influence on the vegetable and animal kingdoms; and by the effects which ensue in the economy when they are entirely excluded. These effects have been described in the articles on the *BLOOD* (§ 47.), and *DEBILITY* (§ 6.c.). The vital depression, attended by increased sensibility, mobility, and susceptibility to impressions, and the anæmia and general cachexy, which ultimately result from the protracted exclusion of light, are sufficient proofs of the beneficial influence of the sun's rays upon the frame. But additional and more direct evidence is furnished in the greater activity of the vital functions in spring; and in the genial excitement of the frame of the aged and debilitated, and indeed of both the minds and the bodies of all, by sunshine; light, as ordained and regulated by nature, being a salutary stimulus, and necessary to the energetic and healthy performance of all the functions. The exciting and depressing effects of the excess and absence of light respectively prove its influence over all the organic and mental manifestations, and consequently its power in predisposing to, and even exciting, disease—the intense or continued action of light inordinately exciting the nervous and vascular systems, and producing disorders of this kind; its abstraction weakening all the mental and bodily functions, and favouring the occurrence of diseases of debility. It is obvious from this, that light, especially sunshine—and even its abstraction—may be made subservient to the removal of disease, either in its individual capacity, or in association with a pure, dry, and temperate, or warm air, assisted by suitable exercise, and change of locality; and that the partial abstraction of one or both of these requisites to the due or energetic performance of the functions, must be ultimately followed by disease, however remote the effect, or numerous the intermediate links in the chain of causation.

38. ii. *THE EXCITING CAUSES*.—These have been called *occasional* by some writers, and *direct* by others, *determining* by several, and *principal* by a few writers. I shall divide this class of causes into—(a) those which are *occasional* in their operation; and (b) those which are *specific*, or whose influence is followed by specific and determinate results. The causes already described, dispose the body to the action of those about to be noticed; either by impeding, modifying, or interrupting some one or more of the vital functions, or by changing the constitution or organisation of the tissues or organs which are the instruments of the functions under the dominion of life. But the predisposing causes may, either by their activity, or by their acting in combination or in close succession, of themselves produce disease, without the aid of any of those which are



usually termed exciting; the predisposing, being in such cases the true and only exciting, causes. Thus the indulgence of the appetites, fatigue, the depressing passions, moist states of the air, &c.—either alone, or associated with age, or constitution, or habit of body, &c.—are often the only causes to which disease can be traced. On the other hand, the *exciting causes* frequently produce their effects without the previous operation, as far as we have the means of knowing, of the predisposing causes; and many of them merely predispose the system to the action of others following in close succession.

39. 1st. *The occasional exciting causes* act either—(a) upon the vital functions, or the manifestations of life in the various organs and structures; or (b) upon the organisation of the part to which they are applied.

40. A. *Of the causes which primarily influence the functions.*—These will be considered in relation to the organs on which they immediately and chiefly act:—1st, Those which are applied to, and disorder or obstruct the functions of the external parts of the body; 2d, Those which make their morbid impression upon the respiratory organs; 3d, Those which act simultaneously upon both the cutaneous and pulmonary surfaces; 4th, Those which act primarily upon the digestive organs; 5th, Those which affect the organs of sense; 6th, and lastly, Those which excite the feelings, passions, and moral emotions, and thereby modify the manifestations of mind, or the functions and organisation of the body.

41. (a) *The causes which injuriously affect the external parts of the frame*, either disorder the perspiratory and eliminating functions of the cutaneous surface, or modify the sensibility, or obstruct the actions, of external parts.—a. The perspiratory offices of the skin are disordered by the diversified modes in which its temperature is affected. *Heat* increases the organic actions of this surface—by exciting the nervous influence, expanding and relaxing the capillaries and exhaling pores, and, indeed, all the integumentary tissues, by determining thither an augmented circulation, and thereby increasing the vital turgescence and excretory functions,—and *cold* diminishes or entirely arrests all these actions (as shown in the art. *COLD*); the excessive increase or diminution of the cutaneous functions in a part or in the whole of the surface, by disordering the balance between those performed throughout the frame, exciting diseases which assume varied forms and grades, according to the predisposition of different organs, the state of the system, and the causes which may co-operate with the change of temperature. Whilst insolation and unusual *warmth* in any form—as warm baths, vapour baths, currents of heated air, frictions, &c.—are powerful agents in the production or in the removal of disease, according to the circumstances in which they are employed, considerable or prolonged *cold* is equally efficient in both capacities. But it is more owing to the vicissitudes of temperature—to their rapid alternations—than to any excessive grade of either, that the supervention of disorder is to be imputed. The sudden suppression of a copious perspiration; the partial exposure, also, of certain parts, and the superfluous coverings of others; or the action of currents of cold air upon one part, and of

radiant heat on another, as when seated near large fires; and wearing unnecessary coverings on the head, whilst the circulation is determined to it by position; are also no mean agents in the production of rheumatic and nervous affections, and inflammations, by deranging both the perspiratory functions, and the sensibility of the parts thus oppositely acted upon. The influence of too much clothing around the hips and thighs of females, and of too soft and warm beds and couches, in favouring uterine and vaginal discharges, and hæmorrhoids; and of too little clothing on the same parts, in obstructing the catamenia; is generally admitted. The want of personal and domestic cleanliness, by allowing the accumulation of sordes upon the cutaneous surface, and the continued irritation of hurtful matters which may have come in contact with it, is a frequent cause of disorder of both its functions and its sensibility, and a common origin of many of the eruptions to which it is liable.

42. β. *Obstructions to the free actions of voluntary parts* are often occasioned by the kind or fashion of the coverings which protect them; and, not infrequently, injurious pressure of parts is superadded. Very thick and unyielding shoes prevent the developement of the muscles of the lower limbs, particularly the gastrocnemii, weaken the ankle joints, and occasion a shuffling gait. Strait, confined clothes, on young and growing persons, cinctures of any part, and too close or straitly braced breeches, sometimes produce diseases of the organs of generation, varicose state of the veins, varicocele, flexures of the spine; and wastings, painful affections and organic changes of the testes. All impediments to free motion and the exercise of our organs are more or less injurious.

43. (b) *The respiratory surfaces* are affected by several of the causes which act upon the cutaneous surface. The operation of a warm and moist, or of a cold and humid, air on the lungs, and, through them, upon the whole frame, has already been pointed out. (See §32—35., and art. *COLD*.) The specific gravity, also, of the atmosphere has some influence in disease; the diminution of it occasionally producing hæmorrhages from mucous surfaces. Exertions of voice or speech, long and loud speaking, running against the wind, and foreign substances floating in the air (as shown in the article on *ARTS AND EMPLOYMENTS*) are common causes of bronchial and pulmonary affections. The pollen or the odour of vegetables, grass, and flowers, the effluvium of new hay, &c., sometimes give rise to severe attacks of asthma, or that form of it which has recently been termed *hay fever*. The animal effluvia floating in the warm, moist, and often stagnant air of assemblies, theatres, camps, ships, hospitals, and crowded gaols, independently of the admixture of any of the specific miasms hereafter to be noticed, change the condition of the organic nervous influence, disorder the secreting functions, contaminate the circulating fluid, and, in this manner, produce effects which are injurious in proportion to their concentration or intensity—generally low or adynamic fevers. Chemical fumes sometimes excite bronchitis; and various simple or compound gases, the air of mines, the exhalations



of privies and sewers, and even of new-painted rooms, are productive of syncope, asphyxy, or even apoplexy, convulsions, and paralysis. In such cases, the diminution of oxygen in the respired air, or the impression made by the foreign fumes or gases upon the nerves of the respiratory organs, or both conjoined, impede, obstruct, or arrest the changes produced upon the blood in the lungs, and ultimately terminate in death, preceded by one or more of the above affections.

44. (c) Several of the exciting causes act upon both the *external and respiratory surfaces*; especially vicissitudes of season, of temperature, and of dryness of the atmosphere, suddenly passing from a cold to a warm air, prevailing winds (see CLIMATE, § 11, 12.), the night or morning air; and numerous circumstances connected with the habitation or locality—especially the existence of the endemic sources of disease in its vicinity—ventilation, temperature, and dryness. The influence of north-east winds in reproducing attacks of ague and rheumatism; of the night and morning air in causing disorders of the mucous surfaces; and of low, damp, ill-ventilated, and crowded habitations, in giving rise to fevers; is well known.

45. (d) *On the digestive surfaces and organs.*—

a. *Mode of operation.*—The numerous and diversified substances which are either commonly, occasionally, or accidentally received into these organs, produce their effects in different ways. Those which are injurious from their specific tendency, or from excess, as numerous poisonous and medicinal substances; and those which disagree, from idiosyncrasy, mode of preparation, or injudicious admixture with others, as various articles of food, drink, and condiment; act in some one of the following modes:—1st, By irritating the villous surface, or altering its organic actions from the standard of health. 2d, By exciting, depressing, or otherwise modifying the nervous power of these organs; the morbid impression being propagated, in a greater or less degree, to other related organs. 3d, By both these modes of action conjoined. 4th, By the absorption of these substances into the circulating fluids, and by their exciting, depressing, or changing the vital actions, through this channel; the manifestations of life in the organic nervous system, or in the blood itself, or in the cerebro-spinal system, or in secreting and excreting organs, being individually or conjointly affected in one or other of these ways. And, 5th, both by their primary morbid impression on the digestive villous surface and nerves, and their consecutive influence, as stated in the 1st, 2d, and 3d heads; and by their absorption and action, in the manner now assigned.\* (See, also, art. POISONS.)

46. β. *Food and drink.*—The full discussion of these topics would comprise the subject of DIETETICS; upon which, however, the scope of this work will not allow me to enter further than very briefly in connection with the causation of disease. They have already received some atten-

tion in relation to climate and season (see CLIMATE, § 26.); and to the habits of individuals as to their use (§ 19.). It must be obvious that any article of diet will occasionally be found difficult of digestion, or even injurious, in certain latent and open states of disorder. When obstructions of any of the viscera, or accumulations of secretions in the biliary organs or in the *prima via*, already exist, owing to weak action or torpor of any of these parts, very slight aberrations from an accustomed diet, or substances not usually hurtful, may occasion very serious disease. It is also evident that the privation of food and drink; excesses in either, or in both; and, in this climate, too large a proportion, or the exclusive use, of either animal or vegetable diet; will be productive of correlative ill effects. The excessive use of animal food, particularly pork, gives rise to plethora, scrofula, and gout; and the want of vegetables, herbs, and fruits, in sufficient proportion to the salted provisions consumed, or an innutritious diet, is productive of scurvy, purpura hæmorrhagica, of an intermediate disorder which may be called land scurvy, and chronic diarrhoea and dysentery. Both flesh and fish are sometimes productive of disorder, owing to their being diseased at the time of being killed, to their becoming tainted subsequently, and to unwholesome ways of preserving them. A poisonous product is occasionally evolved in smoked and dried meats; and shell-fish, chiefly from being imperfectly boiled, and long kept by the retailers, is often extremely injurious. The plan very generally adopted by the fishmongers of London, of preserving fish—especially turbot, salmon, and, indeed, all the fish that is not sold before evening—by means of ice; a large proportion being frozen, thawed, and frozen and thawed again, as alternately exposed in the day on their stalls, and lodged in the evening and night in the ice-pits, until the cohesion of the fibres is lost, and the flavour dissipated; is most prejudicial to health, particularly during summer and autumn; and is one of the most frequent causes, in London, of disorders of the stomach and bowels, although overlooked by writers on this class of diseases. Nor does the evil end here; for all the salmon that becomes tainted from this mode of keeping, is either pickled or smoke-dried, and sold for that prepared in these modes from the fresh state. Independently, however, of these circumstances, all kinds of fish—some more frequently than others—may occasionally disagree, particularly with certain idiosyncrasies, and with weak digestive organs; as lobsters, muscles, &c. Some kinds are even poisonous, especially in warm climates; and others produce disorder from being out of season, as salmon, trout, &c. The injurious action of fish is exerted chiefly upon the stomach and bowels; generally in the form of cholera, attended by extreme vital depression; and sometimes by an eruption on the skin. That the poisonous elements are partially absorbed into, and act partly through, the circulation, may be inferred from their effects, and from their peculiar odour being afterwards detected in the cutaneous secretions. The means of preventing and counteracting the ill effects of fish are stated in the article POISONS. *Vegetables*, even, will also disorder the digestive organs if they be allowed to run to seed, or grow

\* The above classification is in accordance with that published by me in the *London Medical Repository* for May, 1822, p. 380.; and was the first that was based upon the absorption of substances into the circulation, and upon their relative action on the organic nervous, and cerebro-spinal systems.



too far, or if kept too long after they have been removed from the soil.

47. *γ. Cookery and condiments.*—Animal substances become indigestible by being either too much or too little cooked; and vegetable substances, chiefly, by being too little. Fried and baked meats are less digestible than roasted and broiled. Stewed dishes, meats prepared a second time, and very highly seasoned articles, are all prejudicial. Fish often disagrees with the stomach, from the manner of cooking, and the sauces taken with it; and, of these, butter is one of the worst ingredients. Vinegar, lemon-juice, and salt are the most wholesome condiments; and, if the fish be rich and fat, Cayenne or black spice may be added,—these being amongst the best antidotes to any ill effects it may produce. The livers of fish are generally productive of disorder in weak digestive organs; for, during boiling, all the oil—which is extremely wholesome, and even medicinal, and which might advantageously enter into the composition of the sauce instead of butter—is extracted, and, swimming on the surface of the water in which the fish is boiled, is thrown away with it; the part remaining being that only which is generally, but improperly, used. *Condiments*, excepting by those who have been long habituated to them, are hurtful, unless taken in very small, or at least moderate, quantity. Salt, vinegar, and lemon-juice are the most wholesome under all circumstances. The fact, that *salt* is necessary to health at all periods of existence, is not easily reconciled with the equally well-established fact, that the protracted use of salted provisions is a principal cause of scurvy, scorbutic dysentery, external sores, ulcers, as well as an evident predisposing cause of fevers, inflammations, &c. But it may be presumed that the combination of salt with the animal fibre decomposes it or modifies its effects upon the living system. Besides, salted meat, particularly when it has been long preserved, becomes less nutritious, and more difficult of digestion; the ill effects being equally attributable to the deficiency of vegetables, frequently conjoined with bad water, and the depressing passions.

48. *δ. Baked pastes, and pies, tarts, &c.,* and the boiled dough of puddings, are difficult of digestion, especially the former; and should never be taken by dyspeptics. *Fruit*, when in season, is much more wholesome. But if it be used either previously to being fully ripe, or when it has become over-ripe or stale, and particularly if it be uncooked, disorders of the stomach and bowels are frequently produced by it. New cheese is very injurious when partaken of largely; and nuts, cucumbers, and melons are always indigestible, however ripe they may be. A variety of fruits, immediately after a full meal, is also productive of disorder; the most wholesome being ripe oranges, grapes, strawberries, &c. All preserved and stimulating articles of dessert merely load the stomach, occasion thirst, and lead to the ingestion of a greater quantity of fluid, and of wine, than is consistent with easy digestion, and with the regular performance of the functions.

49. *ε. Drink and beverages* are also common sources of disease, either from being of improper kind, or used in excessive quantity. The most wholesome *wines* are port and sherry, after having been six or eight years in bottle, and the

finest and highest flavoured French and Rhenish wines. The constant use, however, of even the best port and sherry occasions vascular plethora, and its consequent ills, unless very active exercise be taken. Delicate persons should dilute them with an equal, or one half the quantity of water. Champagne often excites gout: I have observed two or three glasses of it bring on an attack the following day. *Malt liquors*, although both tonic and nourishing, owing to the hop and extract of malt contained in them, occasion disease when constantly used, from these very circumstances; a plethoric state of the system, obesity, and various contingent diseases, being the result. The most wholesome of this kind of beverage is brisk small beer. *Cider and perry* are sometimes productive of colicky affections, gastrodynia, indigestion, and diarrhoea, especially if they be taken while the body is perspiring, or in very hot weather. *Spruce beer* is much more wholesome. *Spirituuous liquors*, particularly those in common use, are most injurious to the frame; and, in the lower classes, are the most frequent causes of, first, functional, and afterwards organic, diseases of the stomach, liver, bowels, and brain, as well as of some other viscera, and of insanity. *Coffee and tea*, although, upon the whole, wholesome beverages, may be, in some constitutions and states of the system, productive of disorder. A strong infusion of *coffee*, taken soon after the principal meal, promotes digestion, and counteracts whatever ill effects the cold and poor wines used on the Continent might otherwise produce. But it is sometimes injurious, from its stimulant properties, in cases of cerebral irritation or excitement; and, when taken late in the evening, prevents sleep. The infusions of *black or green tea* are gently tonic and narcotic; the latter acting more energetically upon the cerebro-spinal system than the former. Green tea usually excites the nervous power; and, like coffee, increases the activity of the cerebral functions. But, when morbid, vascular, or nervous excitement exists, it generally proves an excellent tonic and sedative; procuring sleep, and diminishing both nervous and vascular disorder. In cases of asthenic vascular action, attended by coma or lethargy, I have found it a most valuable restorative of both vital and cerebral power. In addition to the above, the use of hard or unwholesome water, and either a high or a very low temperature of the ingesta, are often productive of disease.

50. *ζ. The effects of accidental or designed ingestion of poisonous substances*, as well as the means of counteracting and removing them, are considered at another place; and, although *injudicious uses of remedial means* are but too frequently causes of disease, and of its aggravation, especially the inappropriate use of mercurial preparations, of emetics and irritating purgatives, of vascular depletions; of stimulating and heating substances, exhibited with the view of restoring nervous power, or of promoting expectoration, when the increased vascular action from whence it proceeds should be allayed; and of secret remedies of every description; the nature of the subject precludes further allusion to it at this place. The influence of *morbid secretions poured into the digestive tube*, and the effects of arresting accustomed or salutary evacuations, as increased dis-



charges from the uterine organs, hæmorrhoids, &c., or vicarious secretions, without having opened an artificial outlet or produced artificial irritation and discharge, in extending, perpetuating, and aggravating disease, rather than originating it—for morbid states of secretion implying existing disorder—are sufficiently obvious.

51. (e) *The causes which act on the organs of sense* consist chiefly of the abstraction of the natural stimuli or impressions, and the application of them in unusually intense forms; the mental phenomena excited through the *medium* of the senses not falling under this head.—*α.* *Sight* may be weakened by prolonged darkness, and consequent inaction of the organ; but it is much more commonly injured by the unusual impression of light, which may so intensely excite and exhaust its sensibility as to destroy its functions. The rays of the sun, and lightning, have produced this effect almost instantaneously; and the light reflected from snow in northern countries, and from the sands of the arid districts of intertropical climates, has frequently occasioned it in a slower but not less effectual manner. Persons employed in glass-works, forges, founderies, &c., who frequently subject their eyes to an intense light and radiant heat; and those who are occupied on small, very near, or minute objects; are often affected by amaurosis, cataract, and other chronic disorders of the organ. When the sensibility of the eyes is increased by protracted darkness, the admission of even a moderate light often becomes painful and injurious, if it take place suddenly. Of the various colours reflected by the rays of light, white and red are most fatiguing to the sight.—*β.* *Hearing* is injured by very loud noises, or detonations, near to the organ: and persons of weak or nervous constitutions may even lose this sense by such causes; or experience convulsive seizures, syncope, violent palpitations, or disorder of the digestive and circulating organs. Loud noises are extremely injurious in all cases of cerebral and vascular excitement; and in cases of external injury, as well as of internal inflammation. M. PERCY states, that he observed the wounded often very sensibly affected by the report of cannon during sieges and battles.—*γ.* The sense of *touch*, and the *sensibility* of external parts, are acted on by many of the causes already noticed; but often in an imperceptible manner. Numerous external irritants; extremes of temperature, either of the air, or artificially excited, as extensive vesications and burns; violent or protracted excitement of the senses of *sight* and *hearing*; or irritations or injuries of nerves; frequently affect sympathetically the whole frame; and even occasion convulsions, spasms, inflammation of the brain and spinal chord, or of their membranes; and, when extremely intense in relation to the vital resistance of the sufferer, great depression, and even fatal sinking, of the powers of life.—*δ.* The sense of *smell* may be impaired by over-excitement; or by causes acting in this, or in any other way. It is also partly through this sense that various agents invade the system, especially those of a depressing kind, as infectious effluvia. (See art. INFECTION.) Odours sometimes, also, produce syncope, nausea, vomiting, and nervous affections through this medium.—*ε.* The sense of *taste* is least frequently the channel

through which exciting causes act: the impression, however, made upon the palate by certain articles are sometimes productive of severe disorder of the digestive organs; and, in the case of the more active narcotics, &c., of dangerous disease of the nervous system.

52. In the foregoing review, those causes which act *externally upon*, or *through the medium* of, the organs of sense have been noticed. But there are numerous changes, which are *intrinsic*, or take place in the organic, nervous, and circulating systems, as well as in the brain and secreting viscera, and which affect these organs in a very remarkable manner. These, however, are rather *secondary* or *pathological* causes—or the effects of agents acting primarily upon those or other parts of the frame, which effects become contingent or necessary causes of disorders of the organs of sense—from altering their condition, or the state of parts necessary to the perfect performance of their functions. Thus the senses may be disordered or altogether abolished by disease of the brain, or of their nerves, or by affections of the digestive and assimilating viscera. This influence of disease of one viscus or system, upon those anatomically or physiologically related to it, also subsists more or less evidently throughout the frame; the primary affection giving rise to a variety of sympathetic and secondary disorders, according to the progress it has made, to the circumstances that have influenced it in its course, and the predisposition of the individual (§ 21.).

53. (f) *On the sentiments and passions.*—The circulation of the brain, the action of the heart, and the functions of the digestive and generative organs, are frequently disturbed by causes affecting the manifestations of mind.—*α.* Excessive mental employment; long protracted attention, especially to one subject; over-exertion of individual powers, without the requisite repose, and the relaxation resulting from an agreeable diversity of pursuit; the distraction also occasioned by a number of pressing or abstract topics; can seldom be very long persisted in, without exhausting the mental energies, exciting or otherwise disturbing the circulation through the brain, and ultimately inducing either acute or chronic cerebral disease, as phrenitis, delirium, insanity, apoplexy, paralysis, epilepsy, &c.; especially if other circumstances concur to excite or overload the vascular system, and determine the circulation to the head, or if the requisite nightly repose be abridged or interrupted.—*β.* Certain trains of feelings, and particular desires or passions, as religious sentiments, affection, love, hatred, revenge, avarice, pride, vanity, &c., may all be carried to that pitch, by being constantly and exclusively entertained, as insensibly to pass into monomania, or other forms of insanity; or to occasion ecstasy, catalepsy, convulsions, or some one of the diseases mentioned above (*α*).—*γ.* Various circumstances occasioning solicitude, anxiety, distress of mind, sadness, fear, shame, penitence, disappointments and losses of all kinds, the indulgence of grief, and anxious or constant longings after objects of desire or of affection, may not only disorder the mental manifestations in a partial or general manner, but also disturb the functions of the heart, as well as those of digestion and assimilation.



lation. All the depressing emotions of mind have an especial effect upon the circulation, upon the nutrition of the frame, and indeed upon all the functions dependent upon the organic nervous system; and favour chronic and asthenic diseases of the heart, particularly passive dilatation and enlargement of its cavities, indigestion, and constipation; also chlorosis, pulmonary consumption, hysteria, and tubercles, early in life; and hypochondriasis, melancholia, chronic diseases of the liver, spleen, and pancreas, and cancerous or other malignant diseases, at mature or advanced ages.—*δ*. Surprise, fright, terror, anger, and indignation, are not infrequently productive of apoplexy, paralysis, epilepsy, convulsions, syncope, violent palpitations, painful or acute affections of the heart, disorders of the stomach, liver, and bowels, hysteria, abortions, derangement of the uterine functions, and of the manifestations of mind.—*ε*. Great mental excitement, unlooked-for success, the sudden accession of fortune, extreme joy, and all the pleasurable emotions carried to excess, are not infrequent causes of insanity, of phrenitis, epileptic convulsions, hysteria, and catalepsy.—*ζ*. An improper conduct, and an insufficient control, not only of the sentiments and emotions, but also of the imagination, are amongst the most common causes of disorder in the manifestations of mind, as well as of the other maladies enumerated above (*α, β*).—*η*. Inordinate indulgence of the sexual appetite occasions epilepsy, loss of memory, and mental and corporeal debility, impotency, diseases of the testes, prostate gland, and urinary bladder, and affections of the heart and lungs in males; and in females, inflammation of the ovaria and uterus, fluor albus, hysteria, chlorosis, melancholy, irregular convulsions, organic or scirrhus changes in the uterus, diseases of the ovaria, and sterility, &c. (See art. AGE, § 24.)—*θ*. Persons who have been habituated to excessive sexual indulgence, and become altogether continent, are liable to nocturnal emissions, to impotency, convulsive and other nervous diseases, and to disordered mental manifestations.—*ι*. Numerous acts of volition injudiciously attempted or directed may be productive of the most dangerous injuries and disease; as violent muscular efforts, of sprains, aneurisms, hæmorrhages, inflammation and caries of the vertebræ, or inflammation of the intervertebral substances. Positions with the head low, or on the back, and especially such as are uneasy or unnatural, too long retained, or too frequently assumed, give rise to cerebral disorder and curvatures of the spine; and encumbered, obstructed, or too rapid and protracted movements, produce injurious acceleration of the circulation, exhaustion, with other ill effects.

54. *B. The chemical and mechanical causes of disease require little notice here; the former of these having received attention in the articles on ASPHYXY, and POISONS; and the latter on that of ARTS AND EMPLOYMENTS, as Causes of Disease.*—(*α*) *Chemical agents* are injurious—1st, by their influence on the functions of the part with which they come in contact, their effects varying with their individual properties; 2d, by the change they produce in the structure itself, either in combining with it, or otherwise changing its constitution, so as to render it incapable of its

healthy offices; and, 3d, by totally destroying the nervous and vital influence, and intimate organisation of the part.—(*β*) *Of mechanical causes* and positions impeding, upon physical principles, the flux or reflux of the circulation and secreted fluids, continued pressure of various grades, and unnatural ligatures of parts, are the most common, and act slowly, and often insensibly and unremittingly. Shocks or concussions of a part or of the whole of the body, or other kinds of external violence, not only occasion the division, fracture, dislocation, bruise, and comminution of external parts, but also the rupture, laceration, hæmorrhage, displacement, vital depression, or extinction of function of internal viscera, as of the urinary bladder, liver, spleen, stomach, and bowels, brain, spinal chord, &c.

55. *iii. THE SPECIFIC CAUSES OF DISEASE.*—Of the causes which may be thus termed, emanations from the soil are, perhaps, the most common.—*A*. The *miasmata* arising from stagnant water, partially covering the soil, or covered by vegetating substances; from vegetable matter in a state of decomposition; from moist absorbent soils exposed to the sun's rays; from the muddy and foul bottoms of lakes, marshes, and lagoons, or the marshy banks of rivers and canals; and from low grounds which have been partially inundated by the ocean or by rivers; are productive of agues, enlargements of the spleen, of the liver, and even of all the glands, rheumatism, catarrh, &c., in cold or temperate climates; and, in addition to these, of remittents, bilious and gastric fevers, dysentery, cholera, diarrhœa, and hepatitis, in warm climates and seasons, according to the predisposition of the patient, and the circumstances which have aided the action of the efficient cause on the system.

56. *B. When dead animal matters or exuviae mix with vegetable substances, and putrefy along with them, in a warm and moist air, the effluvia assume a more noxious form, especially if the air stagnates in the vicinity of its source; and it becomes more certainly productive of disease than that which proceeds from the decomposition of vegetable matter only; the effects produced by it being often of a more adynamic or malignant character. In warm countries, the localities enumerated above abound with dead animal bodies, and the exuviae of immense swarms of insects; and hence may be inferred the reason wherefore terrestrial emanations in these climates give rise to more severe forms of intermittent and remittent fevers, depress more remarkably the vital powers, derange more the vascular system, and more sensibly affect the blood and the secretions, than the miasmata exhaled from similar places in northern latitudes. The water of low, moist, and marshy places is also productive of various maladies, particularly of dysentery, chronic diarrhœa, diseases of the spleen, Guinea-worm, &c. These causes and effects, with what is at present known of their operation, are more fully discussed in the arts. ENDEMIC INFLUENCE, and FEVERS.*

57. *C. Emanations from animal matter only, the air being in other respects uncontaminated, or frequently renewed, are seldom productive of any serious maladies. But when they burst forth suddenly, in a close and moist air, the effects are sometimes most pernicious. It has been recorded, that fevers of a very malignant kind have attacked*



persons who have opened a grave and exposed the body whilst undergoing decomposition, the effluvia having instantly produced a sensible influence upon the frame. The effects of air accumulated in sewers, privies, &c., are shown in the article on ASPHYXY.

58. The *particular elastic fluids* which are evolved from the foregoing sources have not been satisfactorily demonstrated by analysis. They seem, however, to consist of an admixture of various gases, in very variable proportions, particularly sulphuretted hydrogen gas, and sulphuro-carburetted hydrogen, with azote, and aqueous vapour, holding the subtiler particles of decomposed animal and vegetable matters in solution; which particles most probably make the most injurious impressions on the frame, and are the actual causes of the consequent disease.

59. *D.* The various *exhalations and secretions* formed in the course of disease are most common and important causes. These consist either entirely of insensible emanations from the bodies of persons affected by the exanthematous and specific fevers, &c. (*infectious*); or altogether of a consistent and palpable fluid formed on the morbid surface of the diseased body or part, as the itch, lues venerea, &c. (*contagious*). Many of the maladies which spring from specific causes, propagate themselves, both by impalpable or invisible emanations from the body floating in the surrounding air, and by the contact of a consistent fluid or virus formed in the diseased part, with a part of an unaffected body rendered capable of being affected by it. Such is the case with small-pox and plague (*both infectious and contagious*). Maladies which are produced by the contact of a consistent fluid secreted by a diseased part, may be propagated artificially, or by inoculation, although not in every instance where it is attempted. Those, however, which do not form upon some part of the chief seat of disease a consistent secretion, capable of being artificially inserted in a healthy body, may nevertheless be conveyed from one person to another, by bringing substances capable of absorbing and retaining for a time the emanations given out from the diseased body, as frequently demonstrated by typhus and scarlet fevers, &c.; and all those which are propagated by contact, or by a palpable fluid, also, may be disseminated in a similar way. The substances thus imbibing and conveying the invisible or *infectious* emanations, as well as the palpable and *contagious* virus or consistent secretions, have been called *fomites* — if a single substance has been the vehicle, *fomes*. Of all the various materials which may thus become the medium of transmitting infectious diseases, animal productions, particularly woollen and hairy substances — manufactured or unmanufactured — furs and feathers, bedding and body-clothes, have the greatest disposition to imbibe the morbid effluvia, and to retain it the longest. It seems as if animal emanations were attracted and retained most strongly by substances belonging to the same kingdom. Next to these, cotton, flax, linen, and other substances of a soft and porous texture, are most likely to convey morbid effluvia. In respect of the diseases which are really *infectious* or *contagious*, or which proceed merely from terrestrial emanations, great difference of opinion exists, and has long existed.

Many fallacies connected with the use of the terms in dispute, much misapprehension and ignorance, great prejudice, and unbecoming acrimony, have characterised the controversies which have arisen on this subject. The topics, however, connected with it, both essentially and collaterally, are fully discussed in the articles on FEVERS — *Causes of*; and INFECTION; — and in those on the diseases, respecting the nature of which difference of opinion has existed.

60. *E. Mode of action of specific causes.* — On this subject, a very general remark merely may be hazarded at this place. Those specific causes which are suspended in the atmosphere or dissolved in the moisture it contains, and inhaled into the respiratory passages, seem to make their first impression on the nerves supplying those parts; the organic nervous system being chiefly affected. That this is the case in respect of marsh miasmata, and other terrestrial emanations, is indicated by the periodicity — the intervals, the recurrences or paroxysms, the exacerbations, and the terminations, of the various diseases referrible to these sources. If the circulating fluid were early and chiefly affected by them, as some believe, morbid action would take place more rapidly, and assume a more malignant and continued form; for, as soon as the blood becomes affected, complete remissions are never detected; whereas all affections of the nervous system, especially those of a functional kind, are characterised by remissions and exacerbations; or by intermissions and regular paroxysms. In advanced stages, even, of those maladies, particularly after the various secreting and depurative functions have been disordered, the circulating fluid probably becomes changed, although not in a very remarkable manner; the chief morbid condition, however, still existing in the organic nervous system. When the miasms floating in the air consist principally or altogether of animal emanations — proceeding either from animal matter in a state of decomposition, or from persons affected by adynamic or specific forms of disease — not only may the first impression be made upon the organic nervous system, but the blood itself may also be early contaminated, although not at first in a sensible manner; for it is not unreasonable to infer, that the fluid emanations from the bodies of the diseased, and dissolved or floating in the respired air, may pass into the blood along with those constituents of the air which partially enter it, and in this way induce a similar disease of the whole frame, owing to the universal diffusion of this fluid, and the very intimate connection subsisting between it and the organic nervous system, even before the changes effected in it have become manifest to our imperfect senses.

61. *iv.* THE DETERMINING OR CONSECUTIVE CAUSES OF DISEASES require little observation, further than that the practitioner should not overlook the circumstance, that the exciting causes, whether common or specific, will frequently fail of being followed by any marked effect, when the system is in due health at the time of exposure to them, and is not subjected for some time afterwards to various additional influences or agents, particularly such as produce a depressing or debilitating impression. Thus, a person who has been exposed to emanations from the subjects of typhus fever, or from marshy grounds, &c., may experience no ail-



ment, until a change of weather—from dry to moist, &c.—or depressing mental impressions, or cold and fatigue, or venereal excesses, or, in short, any debilitating influence, occur to aid its operation and determine its action; and, if no such consecutive causes aid the principal or specific cause, in a few days from the exposure to it, disease will often not appear. I have frequently seen this exemplified in a very striking manner: one instance on a large scale will be sufficient. Between twenty and thirty persons were exposed all night, without cover, to the air of one of the most fatal sources of miasmata furnished by a warm climate, during the unhealthy season, but were soon afterwards removed to sea—far from any further exposure to this specific cause. They continued well for six or seven days, when about half their number experienced great fatigue. All these were nearly simultaneously—on the following day—seized with remittent fever; whilst those who had not been subjected to this consecutive cause, with the exception of two, who were not attacked till several days subsequently, entirely escaped, although all had been equally exposed to the specific cause of that form of fever. Further illustrations from my experience in different climates, and of various diseases, might be adduced; but the simple statement of the above fact is sufficient. The practical importance of it, however, should not be overlooked; for it shows—what I have frequently believed has been successfully practised—namely, that a person who has been subjected to the impression of a specific or any other exciting cause, may escape its effects, if he immediately fortify the system against it, and avoid exposure, for some time subsequently, to all other injurious agents, especially those which lower the vital energies of the frame. Persons even who experience the sensations more immediately caused by exciting agents of a specific kind, as infectious emanations, will often escape by observing this precaution, and having recourse to a restorative regimen, with the usual means of promoting all the secreting and excreting functions of the frame, as shown in the art.

#### FEVER—*Prophylactic Means.*

62. It is unnecessary to enumerate the causes which most commonly come in aid of the exciting agents of disease. They comprise nearly all those already adduced as predisposing the system to, as well as occasionally exciting, morbid action; particularly such as depress vital power, by their specific properties and immediate impression; the abstraction of requisite or accustomed stimuli, as of warmth, food, &c.; whatever impedes the functions of respiration, digestion, assimilation, and excretion; all weakening discharges; depressing affections of mind, particularly fear of being affected by the cause to which the person was exposed; and all circumstances in any way deranging the accustomed tenor of the mind, and habits of life.

63. III. GENERAL DOCTRINE OF DISEASE, OR PATHOGENY (from *πάθος*, disease, and *γεννᾶω*, I gender, or produce).—An examination of the systems of medicine proposed since the revival of learning in Europe, or even of those advanced in modern times, would occupy more of my limits than I could devote to the subject. I shall, therefore, proceed at once to the development of those general views of disease, which observ-

ation and reflection have suggested to me, and convinced me to be of importance, not only in estimating aright the exact state of the more common specific maladies, but in forming safe opinions respecting those more anomalous or complicated affections, which frequently present themselves to the practitioner.

64. I have already contended (§ 7.), that, with few exceptions, which have been particularised, the causes of disease *first* modify the manifestations of *life* in some one or more of the systems and organs with which it is allied; or, in other words, first disorder the functions with which they have a direct relation; and that, after a period of longer or shorter duration, the disorder of function becomes a cause of further disorder in related or associated organs, and ultimately, if circumstances obtain hereafter to be noticed, of change of structure, either in the primary seat of disorder, or in that consecutively affected. From this, and what has been already stated, it will appear that a great proportion—nay, all—of those disorders of internal parts, which have been viewed as *intrinsic* predisposing and exciting causes of disease, are, in truth, pathological conditions, or existing states of disease, induced by some one or more of the causes specified above, and ready to produce further disease, or to lead on to a salutary change, according as the existing state of vital power or resistance, and the influences or agents acting on it, may determine the procession of phenomena, or incline the balance. These primary or early changes, or morbid conditions, may very aptly be termed *secondary* or *pathological* causes, when they give rise to ulterior change either of function or structure; but they are so diversified, that but little notice can be taken of them here, beyond what is necessary to the consideration of general principles; their different forms being more intimately viewed in the articles on specific diseases. It may, however, be remarked that they often exist in latent, or almost imperceptible, states, and predispose the frame to the invasion of causes to which it otherwise might have been exposed with impunity.

65. The great fault of all systems of pathology, down even to the most recent, has been their confined or narrow principles, and consequently their inadequacy to the explanation of all the states of morbid action constantly occurring. Brown and his followers admitted but two modifications of the vital manifestations from the normal state, viz. depression and excitement, whilst he substituted an inappropriate and single term as a sign for those manifestations, which are as obviously and frequently changed in kind as in degree. Dr. PARRY referred the chief states of disease to the vascular system, and to changes in its states of action, without sufficient reference to the nervous system, as controlling and even causing these changes, especially to the organic nervous system, with which the vascular is so intimately connected; whilst his contemporaries, who considered that disease originates in the nervous, and affects the vascular, system consecutively, viewed the cerebro-spinal axis, and its various prolongations in the form of nerves of sensation and volition, as the parts primarily impressed. Considering, however, as stated in the article on DEBILITY (§ 13.), that the intimate association of the organic nervous system with



the vascular system throughout the frame, and particularly in vital, secreting, and assimilating viscera, fulfils important objects,—that these systems are the chief factors of *life* in the various structures and organs, which, however, modify its manifestations, giving rise thereby to specific manifestations of this endowment, according to the nature of their superadded organisation, so that the liver secretes bile and not urine, the pancreas its peculiar secretion and no other, the kidneys urine, &c.—I believe that the causes of disease commonly act directly upon one or both of these systems, most frequently on the former; and generally on their numerous ramifications in one or more of those organs or surfaces, with which the exciting and other causes are more immediately related, and with which they are brought in connection from their nature and properties. Thus, those causes which are applied to the respiratory surfaces, primarily affect the organic nerves distributed to them, and the blood-vessels of the lungs, and in some cases the blood itself; and those which are received into the digestive organs, make their impression on the nerves supplying them, thereby modifying their vital manifestations, as well as the functions of related or associated viscera, according to the properties of the individual agents. Having pointed out the intimate relation of the exciting and other causes to the organs on which they chiefly act, and having here and at preceding places noticed the particular system on which they seem to exert their primary impression, it becomes requisite next to enquire into the nature of that impression, or early disorder, and afterwards to consider the changes which consecutively accrue, and the means which nature employs to arrest their progress or to give them a salutary tendency.

66. i. OF THE PRINCIPAL STATES OF MORBID ACTION.—In considering the earliest aberrations from the healthy state following the impression of morbid agents, without especial reference to the system or organs on which they directly act, we are particularly struck with their very diversified nature; and, upon an intimate view of the numerous shades of difference, often evanescent or inappreciable, between effects apparently similar, we necessarily arrive at the conclusion, that, however multiplied the various *grades* of action or vital manifestation may be, some other differences than such as are purely *dynamic* exist; and that the changes may also be of an *anomalous* or *cachectic* kind,—that the vital manifestations in the various organs may not merely present SIMPLE CHANGES OF DEGREE, but also COMPLICATED ALTERATIONS OF KIND,—that vital action may not only be *depressed* and *excited*, but also *changed in other respects*, or *vitiated*, as well as at the same time either depressed or excited. Sufficient proof of the above positions will immediately suggest itself to the practitioner, when he considers the different states of action that may be even artificially produced by the ingestion of different stimuli, the grades of whose action may be very nearly the same; or when he views the very numerous modifications in degree, form, and kind, in which either vital depression or excitement assumes, even in affections of the same system or organ. He will, moreover, recollect that numerous maladies have come before him, in which

the least distinctive characters were those resulting merely from grades of action; that the most prominent features, whether pathognomonic or diagnostic, had no reference to degree, but to form or kind; and that many of these were of the utmost importance in the recognition of the actual pathological condition, and as bases for therapeutical indications, however difficult it might be to describe or explain them, or to convey such an idea of them as he had himself formed, and successfully applied to practice. Indeed, every one must have remarked, that numerous phenomena, either cognisable to the senses of the observer, or merely connected with the sensations of the patient, indicate rather a change in the condition of life, a vitiation of its properties and manifestations, than any grade either of its depression or excitement. If we take the common symptom of pain, as remarked by Dr. PRING, we have no evidence that it is more intimately allied to increased, than to diminished, vital action. In imputing it to altered sensibility, we in fact imply that the alteration is not altogether one of grade merely; indeed, a careful examination of related phenomena will show that the most intense states of pain are more commonly connected with lowered than with exalted action. As respects, therefore, numerous changes in particular functions and organs, as well as in the whole body, and its general manifestations, it may be inferred, that the *condition or properties of life*, and consequently of vital action, may be altered very variously, otherwise than in degree; and that, as intermediate grades of action or vital manifestation are innumerable, and admit only of an arbitrary estimation, so are the modifications or alterations of it, in kind or condition, equally diversified,—merely the more prominent features admitting of recognition by our imperfect powers of sense and intellection.

67. 1st. OF THE DYNAMIC STATES OF VITAL MANIFESTATION.—Grades of action must necessarily be infinite, between the lowest consistent with life, and the highest to which excitement can be carried without passing instantly into complete exhaustion. They have been very generally divided into two classes or divisions, namely, those *below*, and those *above*, the medium grade of health; the former having the generic appellations of *debility*, *asthenia*, *adynamia*, and frequently of *exhaustion* when occurring consecutively, applied to them; the latter that of *excitement*, *hypersthenia*, *sthenic* or increased action, and often of *reaction* when secondary or indirect.

68. A. *Debility*, in its various conditions,—primary, secondary, and complicated; as well as its special manifestations and effects in the different systems, tissues, and organs; was fully discussed in an *article* devoted to the subject; where also its pathological relations—its associations, consequences, and terminations, with its practical bearings, were considered at length. I therefore proceed to give a succinct account of that state of vital action or manifestation which seems to mount above the standard of health; and which presents various modifications, and produces diversified effects, not only according to its cause, and the system or viscus primarily affected, but also as it may appear *primarily* or *consecutively*.



69. *B. Of excitement and reaction.*—No circumstance has tended more to prevent the acquisition of sound principles in pathology than the terms introduced by BROWN and his followers, and the meaning attached to them. Indeed, it was a matter of no small difficulty to arrive at a precise idea of what meaning they did convey; for a single word was in itself an hypothesis; and “*excitability*”—accumulated, exhausted, &c.—“*sensibility*,” “*susceptibility*,” &c. were made to perform more than actually falls to their lot. As, however, these terms are frequently employed in medicine, and cannot now be conveniently discarded, it will be as well to state the idea that should be attached to them. *Sensibility* is the faculty of receiving impressions, and of being conscious of them. *Excitability*, the power of being excited by stimuli or irritants, whether consciousness attend the act or not; consciousness generally following their application to organs of sensation and volition, or of animal life; but not when applied to those of involuntary motion, or of vegetative life, unless the excitation be carried to a great height. *Susceptibility* is the power not only of receiving impressions, but of being affected by them, whether the agents be physical or moral, and whatever may be their mode of operation; consciousness either attending or not attending the act, according to the nature of the agent, and the organ it affects. Here it will be perceived, that *sensibility* implies a certain faculty; *excitability* the power of acting only in one direction; and *susceptibility* of being affected in every way, according to the nature of the cause; and that the meanings are the same, whether these terms be applied to a single organ or to the whole frame; they representing intimately allied manifestations of life in organised parts. The states, moreover, which these terms represent, are variously modified in different persons, according to temperament and constitution; but they are still more remarkably altered by the causes enumerated above, as well as by the successive changes characterising diseases; and hence they become important signs of the condition of vital power, and of the progress of functional and organic change. When existing in a very manifest or extreme degree, they are of themselves important pathological states, and in this respect they deserve notice.

70. Sensibility, excitability, and susceptibility are great or especially prominent in delicate, debilitated, nervous, and irritable persons, and are morbidly *increased* by whatever lowers the general amount of vital power, if the functions of the brain be not impeded, or by excited action in any part of the cerebro-spinal axis not attended by pressure. They are much less lively in the robust, lymphatic, and phlegmatic constitutions; and are more or less diminished in congestive diseases, particularly those of the brain; in many cases of vital exhaustion, when the blood becomes contaminated; or when pressure takes place in any part of the cerebro-spinal centres or prolongations. They are likewise temporarily or permanently impaired by the intense, frequent, or continued impression or action of the same impressions; and are restored or heightened by the abstraction of those which are of a lively or intense kind. Although *excitability* is easily and

quickly roused in the delicate and nervous frame, and in states of simple debility, as specified above, yet is it more rapidly exhausted or altogether extinguished; whilst, on the other hand, it is much less readily brought into action in the robust; but when once roused, it is either more energetic or longer sustained than in the debilitated. In these states of disease, which I have denominated secondary and complicated debility, and especially when the cerebro-spinal centres are congested or pressed upon, or when the circulating fluid becomes contaminated, the excitability is either much diminished or altogether lost,—chiefly, however, as respects voluntary organs, when the nervous system of animal life is affected; involuntary parts still admitting of excitation, although not so readily as in health. *Susceptibility*, even more remarkably than the two other powers, is *increased* by debility and novelty of impression, and *diminished* by a robust and due manifestation of vital power; by a repetition of the same effect, whether it be stimulant or depriment, unless each succeeding application of the same agent be made before that of its antecedent had altogether ceased; as evinced by both the causes of disease and the operation of stimulating and narcotic remedies. The complete manner in which the susceptibility to be affected by certain causes of disease is destroyed by their full and adequate action, is shown by several of the specific agents.

71. *Excitement* may be of two kinds, according to the manner of its occurrence: it may directly follow the impression of the exciting or irritating cause, in which case it is *primary* or *direct*; or it may follow as a more or less remote effect of agents which lower the action either of a part or of the frame throughout, when it constitutes what is called *secondary*, or *reaction*, as in the case of the vascular excitement following the application of severe cold to a part of or the whole external surfaces. It is necessary to distinguish between these two grand conditions or manifestations of excitement; for the secondary, or that following indirectly the impression of lowering or sedative agents, may be variously modified throughout by the nature of the primary impression, and its mode of action. Hence one cause for the distinction here made. There are, besides, numerous other modifications of excitement, whether primary or secondary, referrible to the nature of the agent, and the parts of the body on which they have directly acted. The excitement caused by mental emotions is different in its progress, duration, and consequences, from that following the ingestion of spirituous or other stimuli; and this latter, and indeed both, are different from the increased action following sympathetically the irritation of some organ or viscus. In the *first*, the cerebro-nervous and vascular systems are simply excited, the excitement terminating in slight exhaustion, unless some part has been injured during its continuance. In the *second*, these systems are more than simply excited. A more manifest febrile state continues for some time subsequently, with concomitant lesion of the digestive functions or viscera, owing to the passage of a portion of the morbid agent into the circulation, and to the more immediate lesion experienced by the parts on which it made its primary impression. In



the *third*, the excitement is more especially expressed in the organic nervous and vascular systems—the chief factors of life—owing to its extension to the whole of these systems, from the part in which it originated, and still exists: hence its duration depends upon the primary lesion, and there is, in addition to the general or sympathetic excitement, disordered function of the part primarily affected, as well as of those more intimately allied to it. Even from what has now been stated will appear the importance, in pathological and therapeutical points of view, of instituting a comprehensive analysis of those states of vital action to which the term excitement has been applied, and which bears a very wide and often indefinite signification.

72. (a) *Primary or direct excitement* is one of the most frequent effects produced by the agents which surround the body. It may proceed from such only as are external to the frame, and to the part which it excites, or from such as are internal or intrinsic. Its phenomena and consequences vary as it arises from causes acting chiefly upon the organic nervous and vascular systems, and their immediately related organs—upon the organs and functions of organic life—and affecting them principally; or from such as act primarily upon the cerebro-spinal system, and organs of animal life, as those of sensation, reflection, volition, contractility, &c. But the modifications which spring from other sources, especially from the properties of the agent, the intensity of its operation, and the number of parts affected by it, are too numerous for a superficial view, even if the knowledge requisite to the attempt were attained. I must therefore content myself with noticing merely a few of the more prominent features of this condition of life.

73. a. *Excitement of the systems and organs of vegetative life* gives rise to various changes and phenomena, according to the nature of the impression, and its intensity.—Gentle excitation of the *digestive canal* increases the tone or insensible contractility not only of it, but also of all the circulating system, of the hollow viscera, and of fibrous or muscular parts. If the stimulus be considerably greater, either the same effect is produced, or the excitement is concentrated in the digestive viscera, and proportionately withdrawn from other parts. If the excitement be still greater, and be of a kind that irritates the villous surface, the secretions of this surface are augmented, and the muscular coats of the canal roused to more or less energetic action, followed by the excretion of their contents.

74. Excitement of the *vascular system* is generally a consequence of stimuli applied to the digestive surface, of irritation of any kind affecting the tissues, of local inflammation, of stimulating substances conveyed into the current of the circulation, of muscular exertion, and of the lively mental emotions, directly increasing the heart's action. The grade, duration, and effects of excitement originating in this system, vary with the cause and the state of the body at the time. Its gentlest, and, at the same time, most permanent, form is caused by the action of a pure, dry, and temperate atmosphere on the blood circulating in the lungs; whilst the most tumultuous and the most injurious, as respects its effects on the heart and blood-vessels, on the blood itself, and on the

functions of vital organs, is that produced by inordinate or continued muscular exertion; and by the absorption of various stimulating and irritating substances into the blood. Violent exercise affects the crisis of the circulating fluid (see BLOOD, § 134.), causes its irruption through the capillary canals of soft and yielding tissues, as the mucous surfaces and the parenchyma of the viscera, induces inflammation of the heart and arteries, and excites similar disease in predisposed organs. Irritating or exciting substances conveyed into the blood, inflame the internal surface of the heart and arteries, alter the condition of this fluid, occasion various acute and chronic diseases of the vessels (see arts. ARTERIES, HEART, and VEINS), and often severely affect the functions of secreting and excreting viscera, inordinately exciting or inflaming those depurative organs which carry them out of the system.

75. The *portal circulation*, and the liver, to which it is distributed, may be especially excited, owing to the quantity of stimulating, morbid, effete, or foreign matters carried into, or generated in, the blood which is returned from the digestive canal and other abdominal viscera. These may not only inflame the portal vessels, but also the substance of the liver; or, when the materials or elements in these vessels are of a less irritating kind, may give rise to morbidly increased secretion of bile, or to various organic changes and adventitious formations in this viscus.

76. The *absorbent system* is seldom or never co-existently excited with the arterial system. Indeed, inordinately increased vascular action is generally attended by a proportionate inactivity of the absorbents—both lymphatic and lacteal. Whilst it is frequently observable that a weak action of the arterial is accompanied with great activity of the absorbent system. It would seem as if diminished organic action, or that state resulting from an insufficient exertion of the organic nervous influence on the arterial and capillary systems—the chief source of nutrition, structural cohesion, and other vital manifestations—leaves, in consequence of the animal molecules being then held together by a weaker attraction than in an opposite state of this influence, a greater proportion of effete materials, by which the absorbent vessels are excited to increased action.

77. Excitement of *involuntary muscular parts* is characterised by spasmodic contraction of either a permanent or alternating clonic kind—or rather of the various intermediate states between sthenic and asthenic, as marking the extremes—and is generally occasioned by irritants of the surface covering the hollow muscles, and more rarely by direct excitation of the nerves supplying them, and by morbid states of the blood, affecting either them or the nerves supplying them. The asthenic or clonic form of spasm is most commonly associated with exhausted vital power or an impure state of the circulating and secreted fluids, the excitability of these structures being more easily acted upon in weak than in robust frames; and hence, when in action, is more rarely conjoined with excitation than with debility of other organs. It would seem that, in most spasmodic disorders, the excitation necessary to this state of action consists in the concentration of an undue proportion of vital power in the nerves supplying the affected muscles,



and in the muscles themselves, and a proportionate abstraction of it from other parts; and that when the excitability of an unaffected structure or viscus is energetically roused, the pre-existing morbid excitement will be derived from, or subside in, the parts in which it was seated.

78. The excitement of *secreting viscera and glands* presents various modifications and grades, according to the cause which induced it, and the elementary system especially affected. If the organic nerves supplying them be chiefly excited, the special functions they perform will be augmented—their secretions will be abundant. In this case the excitement will be more particularly limited to the organs whose excitability has been acted upon; the morbid condition consisting chiefly of a concentration of vital manifestation or action in them and derivation of it from other viscera, thus occasioning one of the forms of DEBILITY specified in that article (§ 8, 9.), the increased secretion generally preventing the occurrence of febrile commotion or acute sympathetic disorder, unless it be carried very far. But when the excitement is seated principally in the blood-vessels, and assumes the form of inflammation, the specific function of the secreting surface or organ will be variously altered; the fluid elaborated, in this case, by a secreting surface, being either increased or quite changed from the natural state, or both, according to the degree and form of the excited vascular action with which it is affected; and that secreted by glandular structures being also either much altered, diminished, or entirely suppressed, as in cases of inflammation of the kidneys, salivary glands, &c.; this form of excitement not giving rise to the state of vital concentration observed in respect of the former, but frequently to general or sympathetic febrile commotion. Excitement of secreting viscera, then, assumes two forms, viz. that affecting chiefly the organic nerves—the *excitement of irritation*, which is always attended by augmented secretion, and increased determination of the circulation to the part thus affected, but not necessarily with true inflammation, although this may follow; and that affecting the arteries and capillaries—the *excitement of inflammation*, which is accompanied with altered secretion, always in kind and frequently in quantity,—the quantity being often increased in mucous surfaces, and remarkably diminished from glandular organs.

79. The excitement of the *generative organs* may proceed from the accumulation and irritation of their proper secretions, from mental emotions, and from the excitation of adjoining and related parts, as when the rectum or urinary bladder is stimulated. It is, more especially at its commencement, a purely nervous change; the nerves of organic life which chiefly supply these organs being excited, either through the medium of the brain and sensorium, or in a direct manner, and as above stated. There is no part of the economy which furnishes so evident a proof as this does of the influence of the organic nerves upon the local or general circulation; their excitation being here shown to be followed, unless the susceptibility and excitability be entirely exhausted, by increased determination, vascular action, and vital expansion of the tissues; irritation of this class of nerves evidently

determining also in other parts of the body, particularly in mucous, glandular, and cellular structures, as well as in these organs, increased flux of blood, and occasioning the turgidity or vital expansion of the vascular canals running between the extremities of the arteries and the radicles of the veins. The influence of sexual excitement upon all the other functions, especially at the period of puberty, and subsequently; its sympathetic action on the rest of the nervous system giving rise to various disorders, particularly to the numerous forms of hysteria, anomalous convulsions, epilepsy, catalepsy, &c.; and its more direct operation in producing menorrhagia, fluor albus, inflammatory and organic changes of the ovaria and uterus, besides other disorders in both sexes, more especially referrible to premature, too frequently repeated, or to excessive stimulation, and consequent exhaustion of the excitability of those organs; are circumstances familiar to the practitioner.

80. *β. Excitement of the organs of animal life* may arise from intrinsic or organic changes, as from the condition of the organic nerves and vessels distributed to them, or of the blood itself; or from causes affecting the instruments of sensation, the general sensibility of the frame, or any of the mental manifestations; or from those which excite to mental or physical exertion. Intrinsic changes may occur in the organic nerves and vessels, influencing the circulation through the brain, without any very obvious cause; and these may be such as will excite not only this part, but all others depending upon it for their functions. It is more than probable, that with the brain, as with other viscera, the excitation may be seated chiefly in the organic nerves distributed to it, and hence assume more of an irritative state, or of an exaltation of function, without any particular lesion, as when it is simply excited by vinous or spirituous liquors: or the excitement may extend to, and principally affect, the blood-vessels; giving rise, according to its degree, to certain states of inflammatory action, and to general febrile commotion, with more or less lesion of function. It is almost unnecessary to observe that either of those forms of excitement, related as now explained, or both of them coëtaneously, may originate in the exercise of those faculties, of which this organ is the instrument under the endowment of life. It often falls to the physician to trace the progress of excitement in relation to the brain, from the lively exercise of function characterising talent and genius, into exaltations, approaching to morbid, of one or more of the mental manifestations; and next, into inflammatory action or mania; and lastly, into a state indicating mental collapse, or structural change. The influence, particularly in susceptible persons, of lively or of violent impressions upon the instruments of sensation, in exciting the nervous centres, with which these instruments are in constant communication, is shown, not only by the effects of loud noises, and of a strong light, but also by violent or painful stimulation of any portion of the sentient system distributed throughout the frame. The sympathetic operation of external injuries, of extensive burns or scalds, of long-sustained or suppressed pain and sufferings, in exciting an irritative state of the cerebro-spinal axis and its membranes, in increasing their vascularity, and even in giving



rise to effusion, with the related phenomena of delirium tremefaciens, mania, general febrile action, or convulsions, is not the less true or important, from its being overlooked, and the exact seat and nature of the consecutive suffering, as well as the more immediate cause of death, being misunderstood.

81. Excitement of the *voluntary muscles and locomotive organs* takes place either from volition, or from causes acting in opposition to it. Exercise promotes the synovial secretions, and the development of the muscular structures and of their energies. But long-continued exertion increases the flux of blood to the related parts of the cerebro-spinal axis, and to the muscles themselves. The morbid excitement, however, of voluntary muscles, which removes them out of the control of the will, has never being satisfactorily explained. Their more asthenic, or clonic anomalous actions, which have been usually denominated convulsions, have been frequently traced to obvious lesion in the brain; but they have likewise been as truly referred to causes seated in the *prima via*, irritating the organic nerves, and, through them, the voluntary nerves. The almost universal state of sthenic spasm, called tetanus, has been ascribed to inflammatory excitement of the arachnoid and other membranes of the spinal chord, from the circumstance of its having been detected in several cases, and by myself in two instances. But this change is as probably a consequence of the muscular excitation, as the cause of it. How, then, does this state of muscular action originate? The answer is not easy. But when we consider the connection — anatomically and physiologically — subsisting between the muscular, the voluntary nervous, and the organic nervous systems, the reasons wherefore irritants acting on either of the latter will affect the former, or those affecting the muscles themselves, or even their tendons, will, in certain circumstances, through the medium of the nervous systems, excite general muscular contractions of a permanent or recurring kind, will not appear so far beyond our comprehension. If we connect the causes of these affections with the earlier phenomena, we shall generally find, even when the exciting agent has acted on an external part, that the organic or sympathetic nerves have been thereby irritated; and that, owing to their influence on the voluntary nerves, a state of spastic action is kept up in the voluntary muscles, or recurs in them at intervals, the brain itself being affected only in those cases which present lesions of its functions. This opinion, published by me in 1821, subsequent experience — pathological and therapeutical — has confirmed me in the belief of, particularly in respect of those cases in which the brain is free from disease. (See arts. CONVULSIONS, TETANUS.) It follows, therefore, as corollaries from the foregoing, that whatever irritates the voluntary nervous system, or makes an extraordinary demand upon its influence, or any of its functions, will excite it, in that part especially upon which the particular influence or function called into operation depends, or with which the part principally acted on is in communication; and will determine to it an increased flow of blood, which may, in certain circumstances, go on to inflammation or structural change; and that irritation propagated to the voluntary nerves will so ex-

press itself upon the muscles they supply, as to give rise to various states of spastic action, according as it originates in the sympathetic nerves, or in the brain, or is connected with other changes, functional or structural. Thus, mental exertion excites and determines the circulation to the head; muscular exertion, to the spinal chord; and local irritation occasionally gives rise, through the medium of the organic and voluntary nervous systems, to spasmodic action of the muscles of volition, of either a remittent, intermittent, or continued form.

82. (b) *Secondary or indirect excitement, or reaction*, is that state of increased function or functions following the impression of causes of a depressing or sedative kind: as when the powers of life, having been for an indefinite time more or less lowered by cold, by terrestrial emanations, or by the effluvium from the sick, react upon the state of depression, and give rise to various phenomena characterised by excitement, which thus becomes one of the terminations of direct DEBILITY (see that article). Great diversity of opinion has existed as to the way in which the economy reacts upon injurious and depressing agents. The *vis medicatrix naturæ*, vital resistance, the conservative powers of life, with other terms, have been substituted as explanations of what admits not of explanation, either by names, however expressive they may be, or by any other means. We can merely express what appears to be a law of nature, and describe certain resulting phenomena. We believe that the organisation is built up and kept together by the aid and intimate alliance of life, and that this principle or endowment may be modified by changes in the structures, the instruments of its functions, — that, in short, so intimate is the union of life with all the organs and tissues, that it is constantly influencing them, according to its varying states, and being itself influenced by them, as they become changed, both in respect of its local alliances and its general condition. And all that we can know respecting *vital resistance and reaction* must resolve itself into the general inferences, viz. 1st, That the innate powers of the vital principle, and the intimacy of its union with its material instruments, are such, that it opposes, by means of these alliances, — by its manifestations throughout the organisation, and by their mutual dependence and reciprocative influence — and by the manner in which it is influenced or modified by changes in its allied organs, — impressions of an injurious nature, the intensity of which is not so great as immediately to dissolve its connection with the structures, or at once to overwhelm its energies; and that, whilst it thereby *resists* the further progress of change, it at the same time restores that which has been induced; these phenomena constituting what has been called *vital resistance*: 2d, That when the morbid impression is energetic, a succession of changes generally follow in some part of the economy, owing to the circumstances now adduced, calculated to remove the primary impression, and its more immediate effects, to recover the last balance of vital action, and to restore the impeded or interrupted functions, — to these changes the terms *reaction* and *secondary excitement* have been applied; which, however, may be variously modified, in form as well as in degree and duration:



3d, That when the impression and its immediate effects are very intense, relatively to the state of the person's constitution, the vital endowment may be thereby rendered incapable of resistance, or of developing any reaction; and, when this is the case, it sinks more or less rapidly, before the cause that effected it; sometimes, however, making certain feeble and abortive efforts at restoration, until, between its depressed state and the consequent changes on the tissues, its further manifestations and material alliance altogether cease.

83. If we endeavour to trace the succession of morbid phenomena characterising the simpler states of reaction, viz. those which take place from cold or from marsh miasmata, some idea of the way in which they are brought about may be formed. The impression made by cold upon the nervous, and, through it, upon the vascular systems, is evidently depressing, and vital action is diminished in the parts to which it is applied. Vascular determination, consequently, takes place to other, more especially to internal, parts; which are thereby excited, and their vessels enabled to react upon the greater quantity of blood sent to them. The consequence of this, in secreting organs and surfaces whose vital energy is not impaired, is an increase of their proper functions, as an augmented flow of urine, or free discharges from the bowels; but, during a state of predisposition to vascular lesion in any of the parts experiencing the increased determination, inflammatory action will be the result; and disorder will be extended thence to the whole frame, through the medium of the organic nervous and vascular systems, with especial affection of the internal organ primarily disordered. In other cases, a less simple process may take place; and the impression of cold not only may impede the exhaling and secreting functions of the surface or organ on which it directly acted, but, through the medium of the organic nervous system, may also interrupt the action of other secreting organs; and thus give rise to increased plethora, attended by the retention of elements in the circulation, which the healthy performance of the functions would have eliminated from it. The necessary consequences of these states will be reaction upon the distending and exciting contents of the vascular system; during the continuance of which, those organs which are most predisposed to disease, particularly to inflammation, will suffer especially. When miasmata act upon the system, it may be inferred, from the more immediate effects, that the nervous system of organic life is thereby especially impressed, and its influence diminished; the vital actions more immediately depending upon it impaired, and the secreting and excreting functions impeded. As those changes are often gradually induced, a considerable period of latent or of slight ailment may exist; until at last they reach their acmé, and the organic nervous energy is unequal to the active continuance of the circulation. When this point is reached, animal heat is imperfectly evolved; and the usual changes on the blood, as well as the proper functions of the viscera, are insufficiently performed. The necessary results are congestions of the large veins and yielding structures, and all the phenomena of the cold stage of intermittent or remittent fever; which rarely

proceeds so far as to overwhelm the power of vital resistance, but more commonly ends in the developement of reaction. This is brought about by the greater fulness of the vascular system, and the more exciting properties of the blood, arising out of impeded secretion and excretion, and retention of exciting elements in the circulation, assisted by the influence of the rigors attending the cold stage in accelerating the circulation through the veins.

84. From what has been already advanced, it will appear evident that the nature of the *primary action*, or impression made upon the system by the depressing cause, will not only determine the character of the more immediate phenomena, but will also modify the state of reaction into which these may pass; and even the kind or *type* of action will not terminate with the developement of this form of excitement, but will generally continue long afterwards. This is remarkably exemplified by the morbid impression made by malaria, which will apparently act in the manner now stated, until the hot stage of the disease, or that of reaction, is produced by it; and, although this subsides, and is followed by free secretion, still the morbid impression is not thereby removed, or its type changed, but continues, in the organic nervous system, to exert its influence upon all the vital actions, and to reproduce the same series of morbid changes, until either it is exhausted by their recurrence, or some internal organ undergoes structural change, and the disease thereby becomes complicated, or in some respects modified. Such is the case especially when it is left to nature. That the morbid impression is made chiefly on the nervous system, is shown by the periodicity of action, by the circumstance of the successive changes and free evacuations terminating the paroxysm not bringing the disease to a close, and by the most efficacious means of cure being those which most energetically excite that system. That the impression is made upon the organic nervous, and not upon the cerebro-spinal, system, is shown by the more especial affection of those functions and organs which the former actuates, and the general absence of any considerable lesion, even of the functions of the latter.

85. *C. The intensity and duration of excitement, whether primary or secondary*, vary remarkably, according to the cause, the constitution and habit of the patient, the circumstances in which he is placed, the agents or influences which continue still to act, and the states of the individual viscera, and of the circulating and secreted fluids. As respects *intensity of excitement*, it may be inferred that, where susceptibility and excitability are both great, intensity of excitement will also be great, but only relatively to the state of vital power; and that it will so much the sooner, and the more completely, exhaust itself. But, where neither is considerable, action will be moderate, and reaction will more slowly and less perfectly supervene. Where, however, the excitability is great, and the susceptibility not remarkably so, as in many robust states of health, excitement may not be so quickly or so readily induced, but it will be more energetic and of longer duration. Thus we perceive that, in delicate, irritable, or nervous constitutions, excitement is easily produced, and soon arrives at its termination; whilst the reverse ob-



tains in the robust. In the phlegmatic, lymphatic, and cachectic constitution, it is excited less perfectly and with greater difficulty, and often assumes a modified form, particularly as respects its terminations. When excitement arises *directly* from a *cause* that is constantly present, as when an irritating body is lodged in the intestines, or in any of the tissues, it generally is continued, sometimes remittent, and of long duration; but when it occurs *indirectly*, or from a depressing cause, it may be either imperfect or of short duration, the consequent exhaustion being great. This is evinced by diseases arising from malaria; reaction being less perfect, and vital depression with its effects more remarkable, when the cause continues to operate, owing to the residence of the patient in the locality which generates it. Excitement is, moreover, *modified* by states of the air—humidity lowering it, and a dry, pure air developing it—by mental emotions, by the condition of the circulating fluid as respects purity, and by previous health and habits. How these will influence the occurrence and course either of primary excitement or of reaction, is evident. The state of the vascular system as to fulness has also a great influence upon both: *plethora* favours local excitement and determination; whilst, when very great, it prevents the free development of reaction, and disposes to dangerous internal congestions in circumstances that would have otherwise induced a free and salutary reaction. The condition of the *secretions*, also, has a marked influence in the production and duration of increased vital action. The accumulation of morbid secretions in the *prima via* or in the biliary apparatus may either impede the occurrence, or shorten the duration, of excitement; or may determine it more especially to these parts. The state of the circulating fluid itself, particularly in respect of *purity*, will mainly influence this manifestation of vital power. If it contain stimulating elements in excess, reaction will be rapidly and strongly developed. But if materials of an opposite kind be carried into or developed in it, neither primary nor secondary excitement may at all appear; the conditions of life throughout the structures being thereby depressed and modified, and the living solids ultimately rendered unfit for the performance of their functions.

86. *D. The consequences and terminations of excitement, primary or secondary.*—(a) The *consequences* of excitement are, 1st, Various morbid productions or plastic formations, capable of organisation in certain situations, particularly when the vascular system has been affected in a sub-acute form; as the formation of coagulable lymph, and albuminous exudations in the form of false membranes, &c. 2d, The exudation of sanguineous, or sero-sanguineous, or muco-albuminous fluids; as in cases of acute irritation of mucous surfaces. 3d, The production of various changes in the structures (see INFLAMMATION), and adventitious formations.—(b) The *terminations* of excitement are varied according to the system or tissue principally affected, the nature of the cause, and the concurrent circumstances. It has been stated as a general axiom, that excitement terminates in *exhaustion*, the degree of which is proportionate to the height to which the former had been carried. But there are numerous exceptions

to this, especially as respects reaction; which may be very slight, and yet the exhaustion may be extreme. The nature of the chief cause, numerous influences connected with the constitution of the patient, the surrounding media, and the mental affections, will modify the results.—*α.* Excitement, in any of its forms, may gradually subside into a slight and chronic grade, in which it may give rise to certain changes in the nutrition or secretions of the tissues affected; to morbid depositions, and effusions in shut cavities or the parenchyma of organs; or to increased secretions from mucous and glandular parts.—*β.* It may also pass more rapidly into exhaustion, expressed more especially either in one of the nervous systems, or in the capillary and vascular system, or in the absorbent system, according as one or other of these had been principally diseased. (As to the effects of exhaustion on the different functions, organs, and structures, see the article on DEBILITY, § 10—25.)

87. 2d. OF PERVERTED STATES OF VITAL POWER.—Having considered the simpler changes of the conditions of life, as manifested in the functions and characterising disease, those which are more complicated are next to be discussed; and it remains to be shown, *that the conditions and material alliances of life may not only be changed in degree, but also in kind*—the change in kind being, in some cases, unconnected with either excess or defect of action; and, in others, associated with the one or the other; but more frequently with depression, or an irregular distribution of the vital energies, and concentration of them towards particular parts. The conditions of life present *three states or stages of change in kind*, without any reference to degrees of action:—1st, Modifications in function, or vital manifestation, the proper offices of the part being vitiated, but the structure not being sensibly changed. 2d, Modifications of function, in connection with change in the constitution of the part; the natural tissues having been metamorphosed by an alteration of their nutrition or secretions, and by adventitious formations. 3d, Modifications in function and organisation in several parts, or in the whole of the frame; generally attended by a vitiation of the circulating fluids.

88. *A. The conditions of life may be modified in kind, without any visible alteration of structure.* This state is often the commencement of the others now particularised; but it also frequently proceeds no further, or one form of it may merely pass into another, or terminate in health. Its slightest grades are more especially seated in the moving powers; the organic and cerebro-spinal nervous influences, and the vital properties of contractile parts, being chiefly affected; presenting, accordingly, a great variety of morbid phenomena, not strictly referrible to either excitement or debility, but consisting chiefly of alterations of the sensibility of these systems; of pain and anxiety in their numerous forms; of cerebral affections, and disordered mental manifestations; of lesions of the contractile and locomotive organs; of modifications of the sensible and insensible contractility of parts, of their susceptibility and excitability; and of many changes in the state of the secretions and excretions, independently of those that relate to quantity. In its more exquisite and widely diffused forms, this state proceeds from



several of those causes which I have termed specific; as malaria, animal and infectious effluvia, endemic and epidemic influences, the rabid virus, various poisons received into the stomach, lungs, or circulation, &c. These, as well as the causes which produce the foregoing morbid conditions, evidently modify the nature of the vital functions, without any change of structure or of the circulating fluids to account for the effect; and, when organic lesions do occur, they are consecutive, and sometimes accidental, alterations, which, in their turn, occasion a further change in the life of the part, or of the system generally.

89. *B. The manifestations, as well as the structural alliances, of life may be vitiated in a part of the body, from causes which determine to it a greater share of vital power; or which act frequently or permanently upon its excitability, and occasion an irregular distribution of life throughout the economy; or which abstract from it any portion of its nervous or vital influence; or modify the condition of this influence by their primary impression or continued action, particularly in constitutions predisposed to some hereditary vice, or imperfectly organised, or debilitated. A similar result may also follow unwholesome or innutritious food; the too frequent or excessive discharge of recrementitious fluids, as the seminal and prostatic; the absorption of an imperfectly prepared chyle, or of morbid secretions; or products generated in the body; repeated excitation of an organ, or continued irritation of a particular part, ending in change of structure, &c. When the vital actions of a part are depressed, or modified in any manner, or from whatever cause, and the change continues, owing to the vital endowment being insufficient to overcome it by local or general reaction, and thereby to restore the healthy condition — the powers of vital resistance and restoration being incapable of removing the morbid impression, — a succession of alterations may supervene: the depressed or otherwise modified life of the part will impede or diminish its circulation, or occasion its congestion; thereby facilitating changes in its fluids, or giving rise to alterations of its secreting and nutritive processes; and, ultimately, to various organic lesions of a chronic or malignant kind. Also, when the organic nerves and vessels of a part experience a continued or often repeated excitation of too slight a grade to extend far, or to affect related and sympathising organs, but sufficient to modify either its secreting or its nutritive actions, or both, its elementary tissues at last become more and more altered, adventitious formations are developed, and the continued change in the conditions of life in the part at last gives rise to a complete metamorphosis of structure. The life of the diseased part, having thus formed to itself new alliances and instruments of altered manifestations, is thereby, in its turn, further acted upon, until the vital endowment is modified throughout the body; the local alteration of structure experiencing, from this circumstance, a remarkable increase: and hence the properties of life, and of its structural alliances, act and react upon each other, until they become very sensibly vitiated, first in the part primarily diseased, and ultimately in the whole frame. Such appear to be the origin and progress of various changes of structures of a local, specific, and adventitious kind — tu-*

bercular, scrofulous, scirrhus, fungous, carcinomatous, &c.

90. *C. The functions of life and the organisation are often vitiated, independently of grades of action, either in several parts, or in the whole frame. — Alterations of this nature are frequently the most advanced states of the foregoing; commencing, as I have now stated, in modified vital manifestation of a part, or of the whole body; and irregular determinations of it, which superinduce alterations of secretion and nutrition, give rise to changes of the elementary tissues, and the formation of others which are adventitious, and terminate in the state now under consideration, with sensible alterations in the circulating and secreted fluids. But this general morbid condition may also occur more rapidly from causes producing a very powerful and quickly diffused impression on the organic nervous system, and affecting the circulating fluids; as several of the poisons, especially the animal poisons, infectious maladies of a pestilential or malignant kind, epidemic diseases, exanthematous fevers, &c. In all these, the grades of vital depression, or of excitement, — although most important circumstances, and each of them forming grand pathological conditions, when diverging considerably towards either extreme, — are much less distinctive features of the nature of the malady — are not so pathognomic — as differences of kind, which form the only true specific conditions by which we are enabled to distinguish one species from another; as typhus fever from plague, yellow fever from small-pox, scarlet fever from measles, &c. In these, as well as in several other maladies, grades of action merely, or the depression or the excitement of particular functions, or the irregular distribution of vital power throughout the frame, are far less attributes of their nature, than are perversions of their properties. The conditions of life in these are altered more especially in kind than in degree; this alteration in kind constituting the true morbid state. Hence one principal reason wherefore a lowering treatment is much less efficacious in changing the morbid action, than remedies which elevate the vital manifestations, and enable them to oppose progressive deteriorations in their conditions, and in the constitution of their allied structures. The delirium, and the morbid and apparently high vascular action, in many of such diseases, are often no reason wherefore remedies which excite the vital energies, and change their morbid actions, should not be employed. Every practitioner who has ventured beyond mere routine, or the track pointed out by the numerous authors who have written to obtain that experience of which their writings should have been the results, must have observed the beneficial operation of ammonia, camphor, cinchona, quinine, &c. in many cases of the above maladies; and even in states of action where it became a question whether or not an opposite practice should be employed.*

91. *D. Of vitiation of the conditions of life, and of their allied fluids and structures, conjoined with depression or excitement. — (a) The association of depression with vitiation of the conditions of life, and with change of the fluids and solids, obtains in the last stages of the maladies already instanced, particularly in those called malignant; whether originating locally or constitutionally and ad-*



vancing slowly to the condition now being considered, as carcinomatous and their allied diseases; or taking place in a more rapid and violent form, as malignant or adynamic fevers, the effects of animal poisons, &c. It would seem that all deteriorations of the conditions of life are either consequences of, or otherwise related to, depression of them. If we trace the progress of those maladies in which the change in kind is the most conspicuous, we shall find that vital depression is a characteristic of the impression of their exciting causes, even although these causes may also irritate the vascular system, or impart irritating properties to the circulating fluids; for extreme depression of the manifestations of life—of its conservative and restorative properties especially—is frequently conjoined with an apparently high and, as respects rapidity of action, extreme vascular excitement. When great depression is the attendant upon vital and structural deteriorations, the sensible properties of the circulating fluid and of the tissues—the crisis of the one, and the vital cohesion of the other—experience rapidly progressive changes, until the bond of union between life and structure is dissolved; alterations of a very conspicuous kind taking place in various parts of the body some time before death. (See article *DEBILITY*, § 11. 26.)

92. (*b*) The excitement which is sometimes associated with an alteration of the conditions and material alliances of life is essentially morbid, and is different from that which attends an otherwise unchanged or non-deteriorated state of the vital powers. This morbid excitement is generally expressed in particular systems and organs; the vital actions of the rest of the frame being proportionately lowered: but, whether it affect chiefly the nervous or the vascular systems, or take place primarily or consecutively, it soon terminates in profound exhaustion, and in a more or less complete vitiation of the conditions and alliances of life. This is illustrated by the advanced states of adynamic and epidemic fevers, by plague, &c. in an extreme degree; and by the worst forms of erysipelas and eruptive fevers in a less conspicuous manner. The excitement thus associated with other vital and material alterations may proceed directly from its efficient cause, which may excite or irritate, whilst it otherwise affects, the organic nervous and vascular systems; or it may take place indirectly, or consecutively on depression, and be more or less a state of reaction, developed by changes in the circulating fluids, arising either from the absorption of irritating materials, or the interrupted elimination of hurtful elements. But in either case a progressive deterioration is observed; the morbid conditions of life affect the secreting and excreting functions, and consecutively vitiate the circulating fluids, and even the living solids; and the irritating or vitiated state of the former excites the vascular system; and thus alterations of the one reciprocally increase those of the others, either until the alliance of life with the structures can no longer be preserved, or until, in consequence of the exhaustion of the vascular action, which had been excited by the changes in the circulating fluid, and of the effects of this fluid on the secreting and excreting organs, the balance of vital excitement is inclined in their favour, a new action takes place, their functions are resumed,

morbid matters are thereby eliminated from the system, and health is ultimately restored; the change being either ushered in by critical phenomena, or promoted by remedies, the operations of which are merely an artificial or substituted crisis. (See art. *CRISIS*.)

93. IV. DISEASE OF THE FLUIDS AND SOLIDS, ORIGINATING IN ALTERED CONDITIONS OF LIFE, AND GENERALLY IN THOSE ALREADY DISCUSSED.—Morbid exhalation, secretion, and nutrition may be viewed as stages of the same organic action; exhalation passing into secretion, and secretion into nutrition. Thus we perceive the natural exhalations, during disease, assume the characters of a secreted or elaborated fluid, and certain morbid secretions become more or less organised. I shall therefore notice—1st, The simpler changes of exhalation and secretion; 2d, Simple modifications of nutrition; 3d, Preternatural exhalation and secretion, comprising the transformations and misplacements of these fluids; 4th, Preternatural or metamorphosed nutrition; 5th, Adventitious formations, or productions, foreign to the economy—consisting of secretions—(*a*) insusceptible, and (*b*) susceptible, of organisation; and, 6th, Of destruction of parts.

94. i. THE SIMPLER ALTERATIONS OF EXHALATION AND SECRETION.—I have considered in distinct articles, on account of their great importance, morbid states of the BLOOD, and CONGESTIONS of this fluid. I shall here briefly notice changes in the exhalations and secretions.—*A.* The exhalations into shut cavities, or in the areolæ of the cellular tissue, may be increased from the following changes:—1st, From deficient tone, referrible either to the exhaling vessels and pores, or to imperfect vital cohesion of the tissues, or to both: 2d, From deficient action of the absorbents, depending on diminished vital power, or on obstructions in their course: 3d, From increased determination of blood in the vessels distributed to these parts: 4th, From inflammatory action terminating in, or being followed by, effusion: 5th, From obstructed and retarded circulation of the venous blood returning from these places, particularly in the liver, in the heart, lungs, &c.; the consequent nervous and capillary distension favouring augmented exhalation: 6th, From increased vascular or rather serous plethora, owing to the obstruction of some emunctory,—as anasarca, from the sudden arrest of the cutaneous and pulmonary exhalations; and this, as well as other forms of dropsy, from inflammatory or structural disease of the kidneys: 7th, From the sudden arrest of an accustomed discharge from the pulmonary or digestive mucous surfaces, the morbid exhalation being determined to the contiguous serous surfaces; and, 8th, From two or more of the foregoing states conjoined. (See art. *DROPSY*.)

95. *B.* Alterations of the secretions depend—1st, upon the state of the organic nervous influence; 2dly, upon vascular action; and, 3dly, upon the condition of the blood itself—upon the chief factors of organic action and life; and they are thus indications of the manifestations of this principle. They may be—*α.* more or less diminished,—as from causes which lower the organic nervous influence, or retard the circulation; *β.* or more or less increased, chiefly from agents which alter the distribution or determination of organic influence, and consequently of



the circulation and vascular action, either by exciting the secreting structures themselves, and their intimately allied parts, or by depressing, impeding, or obstructing the functions of distant, and especially of other secreting organs, and from a superabundance in the blood of the elements of which the increased secretion is formed;  $\gamma$ . or more or less *altered* from the healthy state, independently of diminution or increase of quantity,—as when the conditions of life are modified otherwise than in grade, and when the circulating fluid is vitiated, either generally, or merely in respect of the greater abundance of some one element;  $\delta$ . or both *diminished* in quantity and *altered* in quality, owing chiefly to lowered as well as modified vital power, to changes in the blood, and to morbid vascular action or inflammation of the secreting organ;  $\epsilon$ . or, lastly, they may be both *increased* and *vitiated*, either from a morbid distribution, and alteration of vital influence and action, owing to the impression of causes on remote but related organs, or from irritation or excitement of the nervous influence of the secreting structure itself, by agents acting either exteriorly to the vessels, or interiorly, through the medium of the blood. Thus, various substances received into the digestive canal will increase and alter the secretions of its mucous surface; and the accumulation of the elements of bile in the blood, with other effete matters, will excite the liver, and give rise to an abundant as well as acrid or otherwise morbid bile. Such seem to be the chief *pathological states* on which morbid secretions depend.

96. From what has been stated, it will be evident that, although alterations of the secretions are often dependent upon vascular action in its various states, from augmented determination to inflammation and its results, and upon conditions of the blood, organic nervous influence has also a marked effect in generating them, and even in originating the vascular disturbances to which they have been most generally assigned by authors. And although the secretions are constantly and conspicuously disordered in fevers and inflammations, yet they are also often remarkably altered in other diseases; and, in some, even constitute the most prominent change from the healthy state. In fevers and inflammations, the secretions are more acutely affected, but are more disposed to a spontaneous and salutary change, than in chronic disorders. In those maladies in which their alterations form the chief pathological state, their natural conditions are very slowly restored; and, even when the restoration is effected, their derangement is apt to recur from the slightest causes. This is exemplified in diarrhoea, diabetes, and several other chronic diseases.

97. (a) The *recrementitious*, as the salivary, pancreatic, and gastric secretions; or the partly recrementitious and excrementitious, as the biliary and intestinal secretions; are more or less altered in most diseases, and from a diversity of causes. Agents, whose operations may be sufficient to excite the organic nerves, but not to produce inflammatory action; or whose properties are calculated to affect the influence of these nerves, rather than the action of the capillary vessels; may give rise to an increase or other change of the secretions in preference to inflammation.

Thus, aromatics and stimulants will excite the flow of the gastric juices, but will not occasion inflammation unless taken in very large quantities; various substances will increase the intestinal secretions, but not inflame the villous surface; and mercury, in small or moderate doses, will remarkably augment the salivary fluid, but, in excessive doses, will inflame the glands and diminish this secretion. The effects of stimulants upon parts related or contiguous to those to which they are applied, also show the influence of the nerves on the secretions,—as the action of certain odours and savours on the salivary and gastric secretions, and of various purgatives on the biliary fluid. Even mental emotions affect the secretions through the medium of the related organic nerves supplying secreting structures; and this effect is not limited to the recrementitious fluids, but is also extended to those which are entirely excrementitious, as the urine, the sweat, &c. The influence of mental anxiety in producing both diuresis and enuresis, and of hysteria in occasioning the former, is well known. Deficiency of the recrementitious fluids causes dyspeptic, hypochondriacal, and other diseases of the digestive organs; impedes or otherwise modifies sanguification and nutrition; and favours the production of nervous affections. Morbid states of the biliary secretion are amongst the most important in pathology. Impure air, want of exercise, increased temperature, rich or full living, stimulating liquors, &c. change both the quantity and the quality of this fluid; rendering it either more copious, or of a deeper colour, and of a more acrid quality, than in the healthy state. Its more languid circulation through the ducts, or its undue retention in the gall-bladder, owing either to indolent habits, or to exhausted powers of digestion and assimilation, favours the absorption of its more aqueous parts, increases its consistence, disposes certain of its constituents to crystallise or to concreate into calculi, and gives rise to various chronic disorders of the liver and of its related viscera. Obstructions to its passage or discharge, and various other circumstances, favouring its absorption on the one hand; and torpor of the liver, or suspended action of this viscus preventing its secretion on the other, and causing the accumulation of its constituents in the circulation; are important pathological conditions, and constitute no mean part of several acute and chronic maladies, besides those in which the biliary fluid is more especially disordered. (See CONCRETIONS—*Biliary*; JAUNDICE, and LIVER.)

98. (b) The *secretions* which are elaborated by the intestinal mucous surface are often remarkably changed, both in quantity and kind. Diarrhoea, dysentery, and cholera present extreme increase and alteration, not merely of these, but frequently also of those poured into the digestive canal from the collatitious viscera, originating in the pathological states adduced above (§ 95.); and illustrate the action of morbid secretions upon the surfaces with which they may come in contact. When these secretions are produced in large quantity and altered quality, whether from a modified and excited condition of the vital actions, or from both, or from these conjoined with an impure state of the blood, the effects following their passage over the villous surface are often very severe, and even disorganising. Thus,



an altered state of the salivary fluid inflames and ulcerates the mouth, tongue, and gums; and the irruption of a large quantity of acrid bile irritates the duodenum, excites severe vomitings and purgings, sometimes with spasms of the voluntary muscles owing to the irritation of the visceral nerves acting upon the related spinal nerves, and, in more chronic cases when morbid secretion is prolonged, even excoriates the intestinal surface. A similar effect very probably is occasioned by the intestinal fluids themselves, as shown in *dysentery*. But the injurious operation of the fluids poured into the digestive canal does not arise only from their morbid increase. Diminished secretion, if it be attended by the accumulation and retention of the fluid in the secreting viscera, and of the mucus on the villous surface, may prove equally detrimental, but more insidiously and slowly. Morbid increase of these fluids is usually an acute, and diminution of them a chronic, disorder. The latter is generally accompanied with alterations in their properties, especially if they are long retained. When the retention and alteration take place in respect of the mucus contained in either the solitary or aggregated follicles, dangerous or even fatal ulcerations, or other organic changes, may be the results. Their accumulations on the intestinal surface favour the production of worms, indigestion, constipation, colic, &c. The manner in which one secretion may be greatly increased, whilst the rest are suppressed, is remarkably illustrated in pestilential cholera. In this malady it would seem as if the efficient cause suppressed the vital manifestations of all other organs, determined the remaining vital influence and circulation to the digestive canal, and occasioned an uncommon increase and alteration of its exhalations; the serous portion of the blood being in great part evacuated in this situation, leaving a portion of its albumen lining the intestinal surface in the form of a mucalbuminous and tenacious exudation.

99. (c) The *excrementitious* secretions are also altered by the pathological states already specified (§ 95.). The changes of these, as well as of the foregoing fluids, are important agents in continuing or aggravating disease, and furnish some of the chief indications of its nature, progress, and terminations.—As the office of the organs which secrete this class of fluids is to expel those elements which are effete, and would be injurious to the frame if retained in the blood, it must necessarily follow, that any interruption to this function, and especially a complete obstruction or suppression of it, must be highly injurious. The dropsical effusions in various cavities following interruption to the action of the kidneys, and the more acute effects of entire suppression of their functions, fully illustrate this. As a large quantity of ingested matters is carried into the blood, either directly from the stomach, or along with the chyle, and discharged from it by the emunctories, it is evident, not only that the kind of ingesta will affect very remarkably the properties of the excretions, but that obstruction or even interruption of any one of them will be followed by serious effects, unless some other organ perform an additional office, vicarious of that which is suppressed; and even in this case, disease will generally ultimately arise.

100. *a.* The *menstrual evacuation*, and even the *lochia*, may be considered as excrementitious secretions, interruption or morbid increase of them being followed by similar consequences to those arising out of suppressed perspiration. That the menstrual discharge has essentially a depuratory effect upon the blood, is shown by the alterations which it undergoes from morbid states of the circulation; thus, I have seen copious catamenia, the fluid being remarkably offensive, irritating, and otherwise sensibly altered from the natural state, form the crisis of erysipelas, and fevers; and a copious, offensive, and excoriating lochia evidently the means of preventing the accession of those adynamic and malignant diseases which often affect puerperal females, owing to the respiration of the impure air generated by several females confined in one lying-in apartment. The catamenia, moreover, is diminished, increased, vitiated, or changed into a serous or mucous secretion—into fluor albus—by the same agents and pathological conditions (§ 95.) as affect the other excretions.

101. *β.* Morbid states of the *perspiration*, independently of its increase or decrease, are not infrequent attendants on both acute and chronic maladies. They may even accompany apparently sound health, particularly when the bowels are habitually constipated; this evacuation being sometimes so offensive, or both copious and offensive, as to render the person thus affected a nuisance to those near him. In this case, the skin evidently performs an office vicarious of the diminution of the intestinal secretions. The perspiration is generally promoted by excited vital action of the cutaneous surface; in which case it is fluid and warm. But it may also be much augmented by a very opposite condition of vital power, as by syncope, the skin being cold and clammy; or by the extreme vascular depression occasioned by excessive fear. In these cases, the lost tone of the integuments, and of the excreting pores, allows the escape of a portion of the fluids contained in the superficial vessels. This change also occurs in many instances of extreme vital depression, and shortly before death in many diseases. It is a pathognomonic symptom of pestilential cholera, in which it is most remarkable; the cold, wet, livid, and shrunk surface, being the result not only of the suppressed vital powers, but also of the circulation of venous blood.

102. *γ.* The *urinary*, of all the excretions, is the least frequently suppressed; the consequences of such a state being, if not soon removed, the most dangerous, or rapidly fatal. Whilst this excretion is very much influenced by the quantity and nature of the ingesta, and by the temperature and humidity of the air, it is also variously altered by disorders of digestion, sanguifaction, and circulation; but more particularly by the conditions of the blood itself, by changes in the nervous influence, and by injuries to the spinal cord. On the other hand, interruptions of the urinary discharge affect the quantity and quality of the circulating fluid, disorder the nervous systems, ultimately increase the exhalations and the other secretions, and change the constitution of the soft solids. The other pathological relations of diseased urine are fully explained in the articles DIABETES and URINE.



103. ii. SIMPLE MODIFICATIONS OF NUTRITION may affect the whole frame, or a particular tissue or part, or merely a circumscribed portion of a single structure. The entire absence of parts, or deviations in the distribution and arrangement of the elementary molecules and tissues, producing the various kinds of *monstrosities*, will be left out of consideration, they being of less practical interest. Those changes which are most important may be resolved into the following:—1st, Alterations of bulk; 2d, Modifications of density and cohesion, either of which may lead to various complicated lesions. *Hypertrophy*, or augmented nutrition, perhaps never affects all the tissues simultaneously; and although generally a disease, sometimes of dangerous import, yet, when seated in the muscles of voluntary motion, it cannot be considered in any respect as a morbid change. It may be conjoined with *softening* or with *induration*, with increase or diminution of density and vital cohesion. *Atrophy*, or impeded nutrition, may also be associated with similar lesions. Any one of these four alterations, or either hypertrophy or atrophy conjoined with softening or with induration, may commence in one, or at most two, of the elementary tissues, and extend to those most intimately connected with it. In these modifications of nutrition—producing variations in size and density—it is understood that the tissues still retain their distinctive characters. (See ATROPHY, HYPERTROPHY, INDURATION, SOFTENING, and ULCERATION.)

104. iii. OF PRETERNATURAL EXHALATION AND SECRETION.—A. *Transformation of the Natural Exhalations and Secretions*.—(a) The exhalations of *serous surfaces*, or shut cavities, may be altered according to the state of organic action in the surface producing them.— $\alpha$ . Exhausted vital action and cohesion will be followed, according to its grade, by the effusion of an aqueous, serous, or sero-sanguineous fluid, the relaxed state of the capillary pores and serous tissue allowing, instead of a simple halitus, the escape of the watery parts of the blood, sometimes with a portion of its albuminous constituents, and even of its red particles; and, under certain circumstances, as of obstructed return of blood from, and congestion of, adjoining parts, and dyscrasia of this fluid,—states not infrequently consequent upon exhausted vital power,—the effusion of a portion of blood itself.— $\beta$ . When depression of vital power and diminished cohesion of the serous surface is associated with increased action of the vascular system and contamination of the circulating fluid, as in several adynamic fevers, the exhalations are not merely increased, they are also turbid and of various shades of colour, from a dirty grey to a dark brown.— $\gamma$ . When organic action is morbidly increased in serous surfaces, the exhalation is changed into a sero-albuminous matter, which is at first fluid or semi-fluid, but which afterwards assumes modified states, according to the grade of constitutional power and morbid action, and the particular characters such action presents,—whether that of pure phlogosis or sthenic inflammation, or that of diffusive phlogosis or asthenic inflammation, or of the intermediate forms. If the organic action consist chiefly of the former, in an acute or sub-acute state, the effused matter will be more or less albuminous, concrete, and spread over the inflamed surface in variable

quantity, and will contain a turbid serum in the opener spaces. If the inflammation be of a diffused kind, the effusion will be more copious, and fluid, varying from a turbid serum to a dirty, deep-coloured, or flocculent, or sero-purulent, or albumino-puriform matter, without any adhesion of the opposite inflamed surface; and thus the morbid exhalation will be altered in all acute cases, as the inflammation, owing to the degree of vital power, has partaken more or less of the sthenic or asthenic state. If the inflammation be of a chronic kind, the effusion will be more dense and coherent, or even become organised; and, when the albuminous exudation consequent upon acute phlogosis has given rise to adhesions, or passed into a chronic state, they become transformed into cellular bands, with or without a turbid or flocculent serum contained in the unadherent spaces.

105. (b) The exhalations and secretions from *mucous surfaces* are also remarkably changed by the states of vital power, of structural cohesion, and of organic action.— $\alpha$ . When vital energy and cohesion are much diminished (§ 91.95.), the watery exhalation from these surfaces may be increased, and transformed to a serous, or sero-sanguineous, or bloody discharge; particularly in some malignant and cachectic maladies. If the tone of the extreme vessels be lost, vital action being at the same time depressed, the sanguineous exhalation will be what has usually been termed *passive*, and the crisis of the blood—both that effused, and that circulating in the body—will be either lost or deficient. But if vascular action be increased, the capillary vessels and pores being either expanded or relaxed, or the cohesion of the mucous tissue greatly impaired, the hæmorrhage will assume more of the *active* characters, and the coagulation of the effused blood be more or less perfect. Between these grades of action, however,—the terms *active* and *passive* expressing the opposite extremes,—there will be every intermediate degree; much of the appearances of the exhaled blood being those of its condition—or depending upon its condition previously to its discharge. (See HÆMORRHAGE.)

106.  $\beta$ . Not only may the purely *exhaled fluid* be thus altered, but both it and the more strictly *secreted fluid*, as the mucous, may be disordered either consecutively or coetaneously. This change is usually a consequence either of local determination and irritation, or of inflammation of a slight or specific kind. In such cases these fluids are thin, serous, ropy, glairy, albuminous, muco-albuminous, or puriform, frequently in succession, and secreted in large quantity. Thus, when the respiratory mucous surface is irritated by catarrh, its natural secretion, which is scarcely evident in health, becomes successively transformed into these states; and a similar effect follows irritation of the digestive surface. In acute and sub-acute inflammations of this tissue, its exhalations and secretions are altered, either to a muco-puriform matter, streaked with blood, or to a puro-albuminous fluid, or to an albuminous exudation, which concretes in the form of a false membrane in the surface that produced it. These modifications of the morbid productions are referrible to the degree in which either the exhaling or proper vessels of the sur-



face, or the mucous follicles, are respectively affected, and to the grade of vascular action.

107. (c) The exhalation usually poured into the *areolæ* of the cellular tissue may be similarly transformed, and the various alterations may respectively depend upon the states of vital power, of vascular action, of structural cohesion, and of the crisis of the blood, particularised above, — a watery, serous, sero-sanguineous, a purely sanguineous, sero-albuminous, or a puriform fluid being poured out in this tissue, either where it connects more external or superficial parts, or forms the parenchyma of the viscera. In such cases, the transformed exhalation is either diffused or circumscribed, according to the state of action, and the consequent nature of the transformation. Thus, great depression or exhaustion of vital power and cohesion is connected with the diffused infiltration of a serous, or sero-sanguineous, or even a bloody fluid, and, if this state be attended by increased vascular action, with the infiltration of a puriform, or sero-puriform, or even an ichorous matter. But when vascular action is increased, and partakes of the phlogistic or sthenic characters, a puriform matter is formed, and is circumscribed (see arts. ABSCESS and CELLULAR TISSUE). The diffused or circumscribed deposition of a puriform fluid, which sometimes occurs in the cellular tissue, and the cavities of joints, consecutively upon inflammation or suppuration in the veins or in remote parts, during states of vital depression, have been explained in the articles now referred to, particularly the former (§ 29.).

108. B. *Of the Exhalations and Secretions which are adventitious to the situation, — or misplaced Secretions.* — (a) *Fatty matter* has, in rare instances, been found in unnatural localities; as in the blood, in the urinary bladder, and in the intestinal canal, either in its cavity, or forming small tumours in the connecting cellular tissue of the parietes. — (b) A *yellow matter* has frequently been observed colouring the various tissues and the secreted and excreted fluids, occasioning jaundice; and, although generally referred to the colouring matter of bile, has only recently been proved by chemical analysis to consist of that substance. This change is often connected with biliary obstruction or disorder, but in many cases no such connection exists, as far as can be ascertained during life or after death. In such instances we must infer — and the inference is borne out by the very sudden manner in which the change takes place, and by other circumstances — that other organs and tissues than the liver may acquire the power, under certain circumstances, of forming or separating the colouring, and probably other principles of the bile from the blood. I have been often convinced by practical observation, that more than one of the principles of the bile have passed off with the perspiration, in persons whose biliary organs were torpid, and in those affected by chronic cutaneous disorders connected with hepatic obstruction, even although the colour of the skin remained unchanged. (c) *Cholesteroline*, another principle of the bile, has also been found in various secretions and structures; and therefore it must likewise be inferred, that it also may be sometimes separated from the blood by the tissues. (d) The *urine*, and certain of its

*peculiar principles*, have been secreted in unnatural situations. Facts of this description were often related by the older writers; and the more precise researches of modern times have determined the circumstance, as respects the presence of some of its principles in the supplementary secretions, which were formerly considered a metastasis of the urine: thus, uric acid has been detected in the sweat, and in gouty concretions, &c.

109. In respect of the *causes* of the misplacement of the secretions, it may be concluded that, as the elements of all the secretions exist in the blood, they may be occasionally separated from it by other organs or tissues, than by those which are the usual instruments of such separation and combination into the state of perfect secretions, particularly when the organs thus appropriated are diseased to the extent of impeding their functions. In such instances, however, the accumulation of the elements in the blood does not excite other organs to the elaboration of a secretion similar to the natural one; but merely to the elimination of the particular element or elements that may be in excess, in a separate form or different state of union to that which it naturally presents. Thus, when the urine is suppressed, it is only urea, or uric acid, that is found in the supplemental evacuations; or when the bile is obstructed, it is not elaborated bile, but certain of its principles, especially its colouring matter, that tinges the secretions, and, in aggravated cases, the structures; or when the milk is suppressed, it is not milk that is found in other situations than in the breasts, but caseum, &c. In the cases of obstruction of the urine and bile, the respective organs being unable, either from paralysed nervous influence, or inflammation, or structural change, to perform their depuratory functions, the aqueous and effete elements which consequently accumulate in the blood are either separated by the tissues, or pass off through other channels, but in different states of combination, the appropriated instruments of the function being incapable of elaborating them into the natural secretions. In cases, however, where this unnatural separation of elements occurs without evident interruption of the functions of the organ destined to excrete them, we must necessarily infer an exuberant formation of the elements in question in the blood, and a consequent elimination of them through additional channels. It is not uncommon to observe jaundice associated with a natural or copious secretion of bile, and even with a greatly augmented evacuation of this fluid; we must, therefore, conclude that the colouring elements are formed so abundantly in the circulation, as not to be sufficiently excreted from it even by the increased action of the liver; and, consequently, that they are accumulated to the extent of being separated by the different structures. It may further be conceded, that the elements may be combined into more or less perfect secretions in the organs destined to excrete them; but that, before they are discharged from them, or excreted from the system, they may be occasionally taken into the blood, and separated from it by other structures, and through different ways.

110. iv. METAMORPHOSED OR TRANSFORMED NUTRITION — or that change which consists of the



transition of one tissue into another—is of a less simple kind than that noticed above (§ 103.)—*α*. M. ANDRAL has shown that the same principle of development which obtains in the foetus, extends also to the morbid transformations of the natural tissues; and that as the cellular is the matrix of the other textures, so it may, from disease, be changed into most of the other simple structures. There are, however, certain facts connected with such alterations deserving notice:—1st. Cellular tissue, in being changed into some other, no further affects the proper texture of the organ, which it either invests or of which it forms the parenchyma, than in causing its atrophy in some cases.—2d. Cellular tissue cannot be transformed into the nervous, unless in situations where the latter previously existed: thus, nerves that are divided, and of which a portion is removed, are first connected by cellular tissue, and subsequently by the extension of medullary substance from each divided extremity.—3d. Other tissues, whose continuity has been dissolved, have the breach repaired, in the first instance, by means of the production of coagulable lymph, which passes into the state of cellular tissue; this latter being frequently afterwards transformed into a texture analogous to that which was divided; thus, divided muscles are reunited by a fibrous tissue; and so on, as respects bone, cartilage, &c.—4th. The nature of the transformation of cellular tissue is sometimes regulated by the functions of the part: thus, when subjected to friction, it becomes a serous membrane; when exposed to external agents, it becomes tegumentary, &c.—5th. Other tissues, besides the cellular, may be transformed, but the alterations are similar to the natural changes they experience in the processes of foetal growth: cartilage being converted into bone, the mucous tissue into the cutaneous; or a reverse course may be followed, in respect both of these textures and of the muscular tissue, which can be changed only to the fibrous. Hence the metamorphoses of cartilaginous, osseous, fibrous, muscular, cutaneous, and mucous structures are much more restricted than those of the cellular.—6th. All tissues, when remarkably atrophied, present evidence of degeneration towards their primitive or rudimentary state, viz. to cellular tissue.

111. *β*. The causes of the mutation of one tissue into another are not easily ascertained. Some have ascribed it to inflammation or irritation. By ascribing it to modified nutrition, we merely express an obvious fact, the cause of which is thereby not more nearly approached. It certainly is not occasioned by inflammation, although several of the transformations may be accidental or contingent consequences of that condition, especially in its slighter grades; for, however we may irritate, or determine blood to a part, we shall not transform it, unless under circumstances identical with those that are concerned in the production of those alterations. The series of analogous changes that take place in the foetus is not connected either with irritation, or with inflammation, or with opposite states of organic action. We can, therefore, impute the metamorphosis only to modifications in the conditions and manifestations of life influencing the nutrition of the organ or part; for we know that increase of function, or of vital manifestation, will often occasion a transformation of nutrition in a

certain direction—will change cellular tissue to a higher grade of structure, as in the development of the organs of the foetus; whilst the diminution or privation of function—that is, of its due vital endowment—will transform the organ which performed it into a more rudimentary tissue: thus, a part becomes atrophied from being unexercised, an unemployed muscle is reduced to a pale fibrous structure, and an impervious artery or duct to cellular tissue. In briefly noticing the specific metamorphoses of tissue, I shall commence with the simplest, and generally the earliest change, in the ascending scale of transformation.

112. (*a*) The *cellular tissue* having always existed as the matrix of the compound structures and organs, it is obvious, when, owing to suspended or abolished function, the superadded organisation devoted to such function is lost, that the cellular tissue will then remain as the primitive structural base. This is shown by the evidence already adduced. The coagulable lymph exuded during inflammation of serous surfaces may become organised into cellular, and even into serous tissue, and be the matrix of certain other changes (§ 140.).

113. (*b*) The *serous tissue*, and the cellular, are often transformed one into the other. Cellular substance may have serous cysts developed in it, in almost any part of the body, either from friction or pressure; or from the lodgement of a foreign body, or the existence of a coagulum, &c. But, independently of these causes, it may have cysts of various dimensions formed in it, either where it invests the different organs, or enters into their internal structure; the parenchymatous organs sometimes being either partly or altogether transformed into a serous sac, or having these productions attached to them. When thus developed, they have been attributed to irritation by some, to a diminution of the natural action by others, and to perverted action by several pathologists. There can be no doubt of the last being the case, whether other states of action may accompany it or not.

114. *α*. *Serous cysts* vary from the size of a millet seed to that of a child's head; they exist either singly or in clusters, have their external surface in contact with the organ in which they are produced, and are either intimately connected with the cellular tissue surrounding them, or entirely without any organised connection. Red vessels are seldom seen passing into them. The structures immediately surrounding them may retain their natural appearance; or may lose it for a time and regain it; or may be shrunk and condensed; or be altogether atrophied, and expanded over the cyst, as in the liver, brain, lungs; or be merely congested; or moreover be softened, indurated, or surrounded by pus, or by tubercular matter, or by blood. In this last case, the cysts themselves are sometimes broken down, or partially destroyed. The investing cellular tissue may also become fibrous, cartilaginous, osseous, or even calcareous; and additional layers thus may be superimposed on the original cyst. The internal surface of the cysts may be smooth, or may present changes altogether similar to those which serous membranes experience from disease; it may be uneven, rugose, granulated, covered by specks of concrete albumen, or



lined by false membranes, with or without cellular bands or partitions running across the cavity.

115.  $\beta$ . These *cysts* usually contain a limpid fluid, but other substances have been sometimes found in them; viz. 1st, a serous fluid tinged with the colouring matter of blood; 2d, blood, with its fibrinous coagulum; 3d, fluid or semi-fluid substances, of a dark colour, probably consisting of altered blood; 4th, a flocculent serum; 5th, a mucous fluid; 6th, a fatty substance; 7th, cholesterine; 8th, the different varieties of pus; 9th, tubercular matter resembling that found in the lymphatic glands of scrofulous persons; 10th, a solid elastic substance, probably consisting of altered albumen; 11th, several species of entozoa. Occasionally two or more of these substances are found in different compartments of the same cyst; and without any appearances in its parietes to account for the circumstance; thus furnishing an additional proof that the state of the secretion does not always arise from any appreciable modification of structure. As to whether these cysts are formed before or after the matters found in them, it may be stated that, in respect of those containing the first three kinds of fluids, and possibly of some others, there can be no doubt of the effused fluid having caused the formation of the cyst enveloping it; but as to those that contain different productions in separate parts of the cells, it must be inferred that the matter is secreted by the parietes or part of the cyst in which it is found.

116. (c) *Mucous membrane* may be produced from the transformation of the cellular tissue—1st, in the place of the old mucous membrane, which had been ulcerated or otherwise destroyed; 2d, in abscesses without external outlet; and 3d, in abscesses having some external outlet, and old fistulous passages. In the progress of this change, the cellular tissue becomes successively smooth, vascular, and raised to the same plane as the continuous surface. It then admits of being detached in shreds from the subjacent tissues; and, in the alimentary canal, ultimately becomes studded with villi. But in abscesses and fistulæ, villi are not formed; and neither there, nor in the digestive canal, does the transformed mucous surface contain mucous follicles. MECKEL and ANDRAL record some cases, in which the internal surfaces of cysts containing a viscid fluid could scarcely be distinguished from mucous membrane. I have seen this appearance in the ovary, where it has been principally met with. The free surface of the false membranes formed on serous surfaces has, in one or two instances, where there existed an external opening, been converted into a mucous-like tissue.

117. (d) The *cutaneous texture* is generally incompletely reproduced after being destroyed; the newly formed part being composed of a cellululo-fibrous layer, without the vascular tissue in which the colouring matter is deposited. Owing to this circumstance, the cicatrices in the black races are usually white. But there are exceptions; the vascular layer being occasionally developed at a later period, and the newly formed texture assimilated to the surrounding surface. When mucous membrane becomes constantly exposed to the air, it generally assumes more and more of the characters of the cutaneous structure, but the transformation is by no means complete.

118. (e) *Fibrous productions* are also evidently formed at the expense of the cellular tissue, the change from the latter admitting of being traced through its various gradations. They are generally composed of delicate filaments, sometimes parallel to each other, at others matted together or interlaced, and occasionally coiled, convoluted, or rolled up; and usually containing cellular tissue between the fibres. These productions may exist as bands, distinct patches, and as rounded or irregular bodies. They may be either pale, or slightly vascular, or exceedingly so; and be disposed in the shape of chords; or in that of membranes, surrounding or covering other parts or adventitious formations; or in the form of tumours.

119.  $\alpha$ . *Fibrous tumours* vary as follows:—1st, They are homogeneous throughout, and consist almost entirely of condensed fibres; 2d, They are lobulated, having cellular tissue interposed between the lobules, in which the fibrous structure is more or less distinct and variously disposed, as stated above; and, 3d, They are, according to M. ANDRAL, granulated, the granules being disposed in lobules, connected by cellular substance. Fibrous transformations often undergo further changes, portions of them becoming cartilaginous, or even osseous. But, instead of these changes, they sometimes experience acute or chronic inflammation, which may disorganise either the fibrous structure or its connecting tissue, giving rise to infiltrations of pus, or of blood, or depositions of fibrine, the purely fibrous tumour thereby undergoing a complete metamorphosis.

120.  $\beta$ . To what *cause* is the fibrous transformation to be imputed? This can be answered only by adducing the circumstances under which it has been observed to occur.—1st. Fibrous growths sometimes appear in an apparently healthy state of the organ in which they are found, and are so completely isolated, a few delicate cellular and vascular connections excepted, as to admit of being removed without affecting the adjoining structure.—2d. The proper tissue of the organs has occasionally disappeared as the cellular tissue has become transformed into the fibrous state.—3d. The organs in which they are developed are sometimes the seat of inflammatory action, but it cannot be determined whether inflammation is the cause or the effect of the transformation. From these facts it may be inferred, that no conclusion, as to the immediate cause of the production of fibrous growths, can be offered with confidence; but that they may probably arise from altered organic nervous influence of the part modifying the state of vascular action and nutrition.

121. (e) *Cartilaginous transformations* are often found under the same circumstances as the fibrous. They are met with in the following situations:—1st. In the *cellular tissue interposed between organs, or connecting different textures*,—as in that subjacent to serous membranes—usually in the form of grains, large spots, or irregular depositions or incrustations; and either unattended by any other lesion, or accompanying changes in the serous membrane under which they are produced, or in the substance of the viscus; these changes being of the most diversified kinds in the different cases. They may also occur in the cellular tissue surrounding morbid secretions and productions,



either as masses, or as membranes; and of themselves, or with the serous or the fibrous transformations, or with both, may form the cysts or envelopes of these secretions.—2d. *In the structure of parenchymatous organs*, the cartilaginous productions are formed, like the fibrous tissue, at the expense of the cellular. They may be deposited in masses, or in the form of envelopes of various morbid secretions. Whilst cartilage is most frequently formed beneath serous membranes, these membranes themselves never experience this change. It is rarely produced in the cellular tissue under the mucous or villous coats; and very rarely in these coats themselves, and then only consequently upon repeated or prolonged irritation. The osseous tissue may also be transformed into cartilage. But in respect of the change of muscle, and of parenchymatous viscera—as the liver, spleen, kidneys, &c.—into cartilage, it is more probable that the developement of this substance in the cellular tissue merely causes the disappearance of the proper structure in the part thus altered. There is, however, little doubt of a portion of brain being sometimes changed into cartilage.—3d. *In cavities lined by serous or synovial membranes*, cartilages have been found, either entirely loose, or attached by a membranous prolongation or pedicle to some part of the parietes. They vary from the smallest size to that of a bean, and are of different forms. They are generally homogeneous and elastic, and sometimes they contain osseous points in their interior. They have been found in the peritoneal cavity, by LAENNEC and ANDRAL; within the serous membrane of the brain; within the tunica vaginalis testis; in nearly all the articulations, but most frequently in the knee and shoulder joints; and even loose in the interior of serous cysts, by ANDRAL. As to their formation, this pathologist thinks “that they derive their origin from the fluid exhaled in serous and synovial cavities;” whilst BÉCLARD and LAENNEC suppose that they are originally formed on the external surface of the membranes lining these cavities, and that they gradually protrude before them the portion of membrane covering them, thereby giving rise to the pedicles by which they are sometimes attached to the sides of the cavities. Morbid cartilaginous formations vary from a fibro-cartilaginous or mixed state, to one purely cartilaginous, in which the internal structure is perfectly homogeneous; they also vary in firmness. They occur in the following situations in some one of these states:—1st, In false articulations; 2d, At the extremities of bones of which a portion had been long previously amputated; 3d, In the situation of ligaments belonging to ankylosed joints; 4th, In cicatrices; 5th, In compound tumours of the uterus, ovaries, and thyroid; 6th, In the form of incrustations or patches, in the parietes of arteries; 7th, In the cysts and envelopes of morbid formations; 8th, In certain parenchymatous organs; 9th, In the interior of articulations; and 10th, In serous cavities, both natural and morbid.

122. (*f*) *Ossiform formations* differ in form, and somewhat in constitution, from the natural osseous tissue; and are generally confined to the cellular, the fibrous, and cartilaginous tissues.—*a*. The *cellular substance* is not susceptible of this change in all parts of the body; for ossific

deposits have not been found in the sub-mucous, although frequently in the sub-serous, cellular tissue; the serous membrane apparently still covering the osseous formations, and giving them a smooth pale surface. This change has been found in the sub-serous tissue in every part of the frame; and it generally begins with slight thickening, and the infiltration of a turbid fluid; morbid nutrition, very evidently in this instance, and, indeed, in most other cases, as I have above contended, commencing in vitiated secretion. The connecting cellular tissue between the coats of arteries, especially that below its serous coat, is still more frequently ossified than the foregoing. Also the cellular substance surrounding fistulous openings, foreign substances, and adventitious secretions or productions, often become incrustated by plates, or grains, or complete layers of osseous matter. Thus tubercles, hydatids, &c. are sometimes contained in osseous envelopes.

123. *β*. *Ossification of fibrous and cartilaginous textures* is a part of the process of developement in foetal and early life; and the process goes on through life, although generally in an imperceptible manner, until old age advances, when it extends more rapidly, and seizes on additional parts of these textures; the fibrous tissue of the arterial system, and the cartilages of the ribs, larynx, trachea, &c., being then often converted into bone. But when parts not liable to this change in old age are affected by it, or when those disposed to it are prematurely transformed, the circumstance is referrible to disease. The experiments of MM. CRUVEILHIER and RAYER show that a certain degree of inflammatory action or vascular injection of fibrous, fibro-cartilaginous, or cartilaginous tissues precedes the osseous deposit; and hence the reason that fractures or injuries are often followed by ossification of the adjacent parts of these textures; and that simple irritation of a slight but continued form has given origin to this alteration. But, in many instances, no cause or appearance of inflammatory irritation could be traced to the ossified part; as when the coats of arteries, the dura mater, the capsule of the spleen, &c. are thus affected.

124. *γ*. The *form, texture, and constitution* of ossiform formations vary much, both from one another and from the natural structure. As to *form*, they are—1st, *Granular*, and either isolated or in groups, their number being extremely various, and sometimes remarkably great; their size extends from a minute point to that of a pea; they are rounded, with either a smooth or a rough surface.—2d, *Lamelliform* or *membraniform*—developed in the adherent surface of serous membranes, or in the parietes of cysts, &c.—of various sizes, and sometimes of several inches in diameter, and consisting of thin irregular plates.—3d, *Amorphous*,—generally found either alone, or in conjunction with other morbid productions in the parenchymatous organs; they consist more of a phosphato-calcareous deposition, than of an ossiform formation. Their *texture* is—1st, *Homogeneous*, and without fibres or any division into compact and spongy parts; 2d, *Obscurely fibrous* or *radiated*, and more nearly resembling the natural flat bones. The *constitution* of natural bones is generally uniform; but that of the ossiform productions varies remarkably in respect both of their earthy or saline



constituents, and of the animal matters they contain. In some instances, the calcareous salts are found with little or no admixture of animal matter.

125. *v.* SECRETIONS AND PRODUCTIONS ADVENTITIOUS TO THE ECONOMY.—The morbid productions about to be considered present an infinite variety of appearances, in respect of consistence, colour, form, &c., occur under the most opposite circumstances, and are connected with the most diversified phenomena at their origin and during their progress. They have all a tendency either to increase by the juxtaposition of new particles; or to grow by the assimilation or intus-susception of matters transmitted to, and circulating in, their own vessels. But, in either case, they undergo various alterations, arising out of their own intrinsic properties, or of the surrounding parts, or of the state of the constitutional powers and vascular action. Such of them as are unorganised are liable to changes chiefly from the conditions of the system, and of the parts in which they are seated. These changes are of a more limited extent than are experienced by those which are capable of performing certain independent actions; and are generally confined to the removal by absorption of the more fluid parts when they are soft, and of the effusion of a fluid matter when they are hard and irritating to the parts containing them. Productions, however, which become organised, exercise functions of their own: they have become the instruments, under the influence of a derived vitality, of performing and secreting nutritive functions peculiar to them; and they thereby not only perpetuate and extend the morbid condition in which they originated, but also superadd others, either of a local or constitutional kind, or both.

126. *a.* The *local changes* connected with adventitious productions are various:—1st. The parts in which they are developed may be natural, or merely compressed by their bulk.—2d. The surrounding parts may be inflamed, injected, or congested, and variously coloured.—3d. They may be either indurated or softened, at the same time that they are pale or injected.—4th. They may be hypertrophied, or remarkably atrophied in other instances; but most frequently the latter; the presence, and probably the pressure, of the adventitious formation diminishing their nutritive action.—5th. They may exhale or secrete a fluid or puriform matter, which may dissolve the inorganised productions, or soften them, and dispose them to undergo further changes. The states now enumerated of the surrounding parts, or certain of them only, may take place in succession; and may follow one another with various degrees of rapidity.

127. *β.* The *phenomena* which attend their commencement are very diversified; but the powers of life more frequently evince various grades of depression, and even of perversion, than those of excitement. In many instances, however, such changes are very slight or scarcely perceptible; but they generally become very manifest in the progress of the morbid production; the functions of organic life—circulation, secretion, nutrition, excretion, &c.—experiencing more or less disorder. When affecting internal viscera, this disturbance may exist long without the nature of the lesion being more than suspected. But the

symptoms, local as well as constitutional, will vary not only with the seat, but with the changes constantly supervening in the productions themselves, and in the structures surrounding them.

128. *γ.* The immediate *causes* of adventitious productions must necessarily vary with their nature. In most of them, the constitutional powers are in fault; and, in some, the cause is chiefly local. Some pathologists have referred them to debility; others, to increased organic action or irritation; and several, to the perversion of the functions of secretion and nutrition. The first and last opinions conjoined will, perhaps, the most nearly approach the truth; for it must be admitted that the perversion of these functions often originates in, or is associated with, debility. Those secretions, however, which proceed from sthenic or phlogistic vascular action, as healthy pus, coagulable lymph, &c., do not fall within this description. With those exceptions, therefore, they may be imputed to that condition of life to which I have already attributed them, viz. to depressed as well as perverted manifestations of vital power (§ 91.). The circumstances, extrinsic and intrinsic, in respect of the frame, under which they appear,—the agency of cold, moist, and impure air, of deficient and unwholesome food, and of the depressing passions, in producing them,—furnish strong evidence of the accuracy of this inference. Even as respects those changes which most frequently commence with signs of local irritation or vascular excitement or congestion, the general conditions of life, and, consequently, the whole economy, are more or less in fault; and are especially concerned in producing the local change, of which irritation, or any other form of local agent, is merely the efficient cause.

129. *δ.* The *terms* which have been assigned to the various productions falling under this head, have been sufficiently arbitrary; and a greater desire has been evinced to discover new species, and to impose on them new names, than to view them as they are actually presented to our observation, and without reference to the descriptions and opinions of their nature—too often erroneous, and improperly mixed up—that have been given of them. Nor have the *arrangements* of them that have been attempted been less arbitrary. Certain of them have been named, from their form, as tubercle; others, from their colour, as melanosis; and some of them, from their resemblance to healthy structures, as medullary, mammary, encephaloid substances: and they have been variously arranged; as, into such as are products of secretion without organisation, or of nutrition with signs of organisation. It must be evident, however, that the difference is chiefly that of terms; for nutrition is only a modification of secretion. They have also been divided into the *encysted* and the *non-encysted*; into the *local* and the *constitutional*; and into the *inert*, or not necessarily noxious, and the *malignant*, or contaminating. These distinctions, although very important, are not uniformly preserved; for the same substance may be both encysted, and non-encysted or infiltrated; and the alteration, which is merely local in some cases, may be constitutional in others, or become so; and that which may long or always remain inert in some instances, may sometimes be malignant and contaminating from the commencement. Besides, they may



originate either in changes in the nutrition of the natural tissues, the adventitious secretion being a consequent lesion; or in the production of new substances, alterations of nutrition being later lesions; or even the secretions, as well as the natural tissues in which they are elaborated, may undergo subsequent transformations. So extremely diversified are the causes which induce these diseases; the states of vital manifestation and of vascular action by which they are attended at their origin and in their progress; and so remarkably are they modified in their course by external agents and intrinsic states of action; and, moreover, so insensibly do they pass into one another, and so frequently and variously are they complicated; that any arrangement must necessarily be arbitrary, and a choice of difficulties. Reference, however, to the varying characters of the adventitious formations having been had in the articles upon specific morbid structures, and upon the varying alterations which the principal tissues and organs present, I shall here only take a general view of them, in the following order:—1st, Secretions adventitious to the frame, and devoid of organisation; 2d, Adventitious secretions associated with morbid nutrition; or those that are apparently organised, but which depend upon the adjoining tissues for their vitality; and, 3d, Those which become organised, and possess an independent life.

130. *A. Secretions adventitious to the frame, and incapable of organisation or vitality.*—These substances present no trace of fibres, laminae, canals, or areolae; they are of various degrees of consistency; and certain of them change either from a fluid to a solid state, or from the latter to the former. They consist chiefly of albumen, gelatine, and the usual salts found in the serum of the blood. The substances that fall under this description are:—1. Pus; 2. Tubercle; 3. Fatty matter; 4. Glue-like matter, or the colloid matter of LAENNEC; 5. Melanosis, or black matter; and, 6. Saline ingredients. These may exist either singly, or variously associated.

131. (*a*) *Pus.*—This term has been applied to a morbid secretion, whose physical properties vary considerably. That form of it which is usually secreted in a state of the constitution not remarkably depressed or vitiated, is a homogeneous cream-like fluid, of a yellowish white colour, faint smell, and slightly sweetish taste. But it often departs far from this state; and even that which is secreted from the same surface, may be very remarkably changed in a very short period, generally owing to modifications of vital power and vascular action. Sometimes it very closely resembles a thick cream; at others a mixture of curds and whey; and at others a turbid serum, or a grumous sanies, or the dregs of wine. Occasionally it seems disposed to become solid, and to assume the appearance of tubercle. At one time it is quite inodorous, at another very foetid. Its colour also changes from white to yellow, from green to red; or this order is reversed. In some instances, it is yellowish green, or yellowish brown, and other related shades. The following are its *varieties*, according to its physical properties:—1. Creamy, homogeneous, or laudable pus; 2. Curd-like pus; 3. Serous pus, or sero-puriform matter; 4. Muciform pus, or glairy puriform matter, or puriform mucus; 5. Bloody pus; and,

6. Concrete or lardaceous pus. These alterations are chiefly attributable to the texture in which it is secreted, to the degree of local irritation or action, to the period it has been retained, to the general state of vital energy and vascular action, to the condition of the circulating fluid, and to the diathesis and constitution of the patient. But these varieties often run into one another, showing that any arrangement of the physical appearances of this secretion must necessarily be arbitrary. In the scrofulous diathesis, however, it often presents certain distinctive characters, and inclines nearer to the curd-like variety, or seems more disposed to become solid, from the absorption of its serous portion, when it has been some time shut up. But the most specific differences that exist in pus are not to be ascertained by chemical research, nor external appearances. Two portions of this fluid, identical in every respect, will produce very dissimilar effects: when introduced beneath the cuticle, one will occasion merely a slight irritation; the other a most dangerous constitutional malady, capable of disseminating itself through thousands.

132. Pus has been found in every tissue, structure, and organ of the body, and in all the vessels, and in the blood itself, both imperfectly mixed, and in the centre of clots. It may exist in the tissues and parenchymatous organs, either collected in the form of abscesses, or disseminated and infiltrated through their structure. When formed in muscular, nervous, and even in some other structures, it is in reality furnished by the connecting cellular tissue, which is the chief seat of the inflammatory action producing it. In a great majority of cases, its presence, either in distinct collections, or in a state of infiltration, is accompanied with signs of irritation or inflammatory action; but instances occur, in which it is attended by no such appearances. The opinion, that it could be formed only where there is ulceration, has been shown to be unfounded: for it may be secreted on the surfaces of membranes, without any breach of continuity; or collected in the parenchyma of the organs, without any appearance of inflammation; or infiltrated between the fibres and in the areolae of the tissues, without any loss of substance. It is met with in the second and last of these forms in the consecutive states of *suppuration*, or when puriform or sanious matters have passed into the circulation, from distant parts, or from disease of the veins, &c. When the production of pus has been preceded by any degree of vascular irritation, the surrounding tissues present—1st, various grades of injection; 2d, various shades of colouration; 3d, different degrees of softening; 4th, solutions of continuity, which may either have preceded or followed the purulent secretion; 5th, the disappearance of the proper structure of the part, and its degeneration into cellular tissue, in the areolae of which the pus is infiltrated. (For the various distinctive characters of pus, the pathological states which generate it, the symptoms that precede and accompany its formation, and the means of protecting the frame against its contamination, see the articles ABSCESS, § 7. *et seq.*; INFLAMMATION, and SUPPURATION.)

133. (*b*) *Tubercle* especially illustrates several of the pathological inferences stated above relative to the constitutional conditions favouring



the occurrence of many adventitious productions (§ 128.). The history of these formations in the lower animals, and the depressing causes so frequently connected with their appearance in the human subject, would lead me to infer — 1st, That the conditions of life throughout the frame, in tubercular disease, are not merely weakened, but also otherwise modified or perverted, either from original conformation, or from acquired diathesis: 2d, That this state of vital manifestation often obtains in connection with tubercles, without any symptom during life, or appearance after death, that can warrant the conclusion that they originate in inflammatory action: 3d, That they sometimes form under circumstances that would lead to the inference that inflammatory irritation is an energetic, although not a necessary, cause of their appearance: 4th, But, that local irritation, or that local or general inflammatory action, can no more account for their formation, than for the production of any other adventitious secretion, without the concurrence of those conditions of life alluded to above (1st); and that, whilst irritation or vascular action does not necessarily excite tubercles, they may occur without the least evidence of irritation: and, 5th, The general conclusion seems to be that the conditions of life modify or pervert the functions of secretion in those parts of the frame in which they are developed, and this perversion is often attended by vascular injection. (As to their SYMPTOMS, NATURE, and TREATMENT, see the article TUBERCLES.)

134. (c) *Glue-like, or gelatiniform matter, or colloid substance.* — Whilst pus and tubercle are chiefly composed of albumen, with varying proportions of water and salts, this secretion consists principally of gelatine. It is sometimes colourless, but it also occasionally presents shades from a yellow to a pale rose tint. It is without any trace of organisation. It is either infiltrated in the areolæ of the tissues, thereby altering very much their appearances; or it is collected in one or more masses, which slightly condense the surrounding structure. When infiltrated into the cellular tissue, it generally indurates this tissue, and constitutes a variety of scirrhus. M. ANDRAL states, that whether the induration is a true hypertrophy of the cellular fibre, or merely the result of mechanical condensation, the jelly-like substance is always traversed and divided into compartments, by numerous, white, hard, resisting plates, which seem to secrete it. Sometimes these plates pass into the fibrous or cartilaginous state; and red vessels have been observed ramifying on their surface, but have never been traced into this peculiar substance. It has also been found in tumours composed either merely of cellular tissue in a state of hypertrophy and induration, or of a variety of morbid products. It is often contained in serous cysts, which appear to have secreted it. When existing in this last form, it constitutes the tumours or cysts called *melicerous*, from the semblance of their contents to honey. It may thus be secreted in the different tissues in either an infiltrated or an encysted form.

135. (d) *Fatty substances* may be secreted in different parts of the system in two forms: 1st, that which is similar in every respect to the fat of the body; and, 2d, that which is in some

respect or other different from it. The *first* variety has been noticed under the head of transformed secretions; the *second* differs in appearance from the natural fat. Cysts of various sizes contain, either alone, or with several other organised substances—as bone, hair, fibrous structure, &c.—a matter resembling suet. These cysts are found in several parts of the body, but most frequently in the ovaries. The parenchymatous organs may have their proper tissue atrophied and replaced by a fatty matter, forming the fatty degeneration of modern authors.

136. (e) *Melanoid* and other colouring matters have been secreted in almost every part of the body. (For its nature and pathological relations, see the article MELANOSIS.) The *golden yellow tinge*, sometimes observed in spots, or generally diffused, in foetal bodies and new-born infants, constituting a variety of what has usually been called jaundice of this class of patients, has been ascribed to a peculiar secretion, called *cirronosis* (*κίρρος*, yellow) by Professor LOBSTEIN; but it is probably nothing more than a modification of the colouring principle of the bile secreted under circumstances described above (§ 108.).

137. (f) The *saline substances* usually existing in all the fluids of the body are sometimes secreted in uncommon superabundance in various parts. But besides these, others, not generally found in the fluids, are secreted; and are found, 1st, in the reservoirs and excretory ducts, through which the secretions, in which they have been formed, pass out of the system, as in cases of salivary and urinary calculi; 2d, in the cellular tissue and parenchymatous organs, either alone, or combined with other morbid productions; and, 3d, replacing other morbid secretions—tubercles being sometimes succeeded by calcareous concretions, &c.

138. B. *Morbid secretion associated with morbid nutrition, or secretions susceptible of organisation.* — This class of productions, in addition to a small proportion of the constituents of unorganised secretions, contain a large quantity of fibrine. M. ANDRAL supposes that a small portion of this substance, either coagulated in the blood-vessels, or extravasated into or upon the tissues, is the original source whence the organised productions are formed; the fibrinous deposit presenting the appearance of a whitish or reddish mass, of variable consistence, and having a tendency to become organised, although at first possessing neither organisation nor vitality. But I believe that all fibrinous exudations have a certain degree of derived vitality, disposing them to organisation, particularly when they continue in contact with the part that produced them. This pathologist considers, that a portion of fibrine may, when coagulated, indicate its vitality without presenting any blood-vessels or any determinate texture; in which state it may be compared to a zoophyte, which performs a certain grade of vital function, although destitute of a circulating system: and that the fibrinous mass, when impregnated with life, becomes the seat of various organic actions; has a tendency to assume the form of some one of the simple or compound animal textures; performs the functions of secretion; and exhibits the same morbid phenomena, when irritated, as the natural tissues do under similar circumstances. He fur-



ther supposes that several tumours, the origin of which has hitherto been mistaken, may be traced to the solidification of fibrine in the blood-vessels of the part; and adduces cases, from the minute dissection of which, he infers, that many of the adventitious productions usually called *cancerous*, *sarcomatous*, *encephaloid*, and *medullary* are entirely formed in this manner; the minute vessels—arterial, capillary, and venous—being filled with solid fibrine deprived of its colouring matter. It appears, however, much better established, that the *latter* especially of these productions are formed chiefly of coagulated or altered fibrine, thrown out of the blood-vessels owing to their perverted action, and either collected in masses, into which blood-vessels are produced, or infiltrated into the tissue of the part, the vascularity of which is increased along with the alterations that supervene in the adventitious formation and its containing structure.

139. It may be stated of organisable products generally,—1st, that they seem chiefly to proceed from the secretion or formation, by the morbid state of the vessels,—frequently depending upon a morbid condition of the frame,—of a certain substance very nearly resembling coagulated fibrine deprived of its colouring matter; 2d, that this substance, from participating to a certain extent in the vitality of the structures in which it is lodged, and from the state of organic action in the parts which formed it, has circulating actions and vessels extended to it, and thereby becomes organised, and capable of performing a certain grade of function; 3d, that it is at the same time transformed into tissues, either similar to the natural textures, or entirely different from them, but equally organised and endowed with life. I shall next notice in a very general manner—1st, Organisable products arising from sthenic inflammatory action, and not necessarily depending upon a perverted or morbid state of the constitutional powers; and, 2d, Those adventitious productions, which not only originate in some constitutional vice, but which also increase both the local lesion and the vitiation of the circulating fluids and living solids.

140. 1st. *Adventitious structures consequent upon sthenic inflammatory action.*—(a) Organisable matter, of a fibrinous or fibro-albuminous nature, is frequently formed on *serous surfaces*, and is generally termed, in its unorganised state, *coagulable lymph*; and in its organised form, *false membranes*, *cellular adhesions*, &c., from its disposition to assume the appearance of serous and cellular tissues. That these adhesions or productions may be absorbed, and almost or altogether disappear, if the constitutional energies continue impaired, is established by the observations of MM. RIBES, DUPUYTREN, VILLERMÉ, and ANDRAL, as well as by my own experience. And I believe, moreover, that they may become more fully developed, and assume progressive alterations, when the vital powers are reduced or perverted. (As to the manner in which they are formed, and their progressive changes, see the articles INFLAMMATION and MEMBRANE.)—(b) The fibrinous exudation sometimes formed on the internal surface of the blood-vessels, and obstructing them, and ultimately causing their obliteration, is in most respects similar to that produced on serous surfaces; the chief difference

is in its influence in attracting the fibrine of the blood, and in the consequent results. (See ARTERIES and VEINS.)—(c) A coagulable matter, more albuminous than that formed on the surface of serous membranes, is sometimes secreted by mucous surfaces. I believe that it is merely a modification of the transformed exhalation noticed above (§ 106.), and proceeding from inflammatory action affecting chiefly the exhaling vessels of the mucous tissue, and transforming the fluid usually given out by these vessels to a fibro-albuminous state; the morbid exhalation concreting in the form of a false membrane upon the inflamed surface, owing to the evaporation or absorption of its watery parts.—Its organisation has been a matter of dispute with French and German pathologists. M. GUERSENT states that he has seen vessels ramifying in the false membranes of croup, and anastomosing with those of the mucous surface. (See CROUP, § 36.; INFLAMMATION, and MEMBRANE.)—(d) The internal surface of *serous cysts* may become inflamed and form coagulable lymph, and thereby give rise to further results;—1. merely to false membranes lining their cavities; 2. to lymph agglutinating their opposite surfaces, and gradually causing the obliteration of their cavities. This latter change often occurs in the cysts formed around coagulated blood, particularly when extravasated in the parenchyma of organs.—(e) The adhesion of *divided structures* takes place in consequence of the effusion of coagulable lymph, which becomes organised, and passes from a cellular to a fibrous state, and ultimately becomes identified with the tissues it unites.

141. 2d. *Adventitious productions, depending upon constitutional vice, as well as upon perverted organic action in their seat*, may be divided into two species—the *consecutive* and the *primary*—the former commencing in *carcinoma*, the latter appearing at once in the true *cerebriform* or *hæmato-cerebriform* states. The former is the connecting link between carcinoma, or hard cancer, and the cerebriform disease. They both have certain points of resemblance,—secretion and nutrition being perverted in both; adventitious productions, and subsequent destruction of the affected tissues, taking place in both; and both being attended by a perversion of the conditions of life, and an increasing contamination of the circulating fluids and living solids. Their chief points of dissimilarity are referrible especially to the manner in which the *former* originates. It occurs, like the transformations in which it begins, in certain parts or tissues in preference to others, and only at mature or advanced epochs of life; commonly commencing locally, and but rarely simultaneously in different parts of the same tissue, or in different structures and organs, however frequently affecting both the one and the other successively.—The *latter*, or *primary*, is met with chiefly at the early epochs of life; it attacks any texture or viscus, either simultaneously or successively, and at once appears as a soft, tumefied, spongy, pulpy, or cerebriform structure, or in some one of its modifications (§ 142.).

142. The *consecutive species* only sometimes occurs in the advanced course of scirrhus-cancer, which usually commences in certain of the states of morbid nutrition and secretion noticed above,



especially in hypertrophy or condensation of the cellular and allied tissues, with a perverted secretion, and deposition of a firm, grey, semi-transparent substance in its areolæ, and without any specific boundary between it and the healthy structure, in some cases; or with a more distinct demarcation, and a regular or lobular formation, in others; or with the secretion of a purely gelatinous substance in minute masses, or in the areolæ of the tissue (§ 134.); or, lastly, with a uniform infiltration of a more albuminous and lighter coloured matter in the texture of the part, giving rise, respectively, to the different varieties of scirrhus. But these hard, grey, or gelatiniform, or lardaceous alterations, are generally softened, liquefied, ulcerated, or even partially destroyed, and have thereby passed into the carcinomatous state, before the adventitious production makes its appearance in any of the forms about to be noticed. Thus, scirrhus passes into carcinoma, or open cancer; and this latter, in rarer instances, into some one of the varieties which the cerebriform malady presents.

143. The *primary* species is very varied as to its colour, figure, size, and consistence. Some belonging to it have a homogeneous structure, resembling coagulated fibrine deprived of its colouring matter, and are of different degrees of hardness, occasionally approaching to cartilage, and sometimes being almost semi-fluid, or resembling putrefied brain. Others of these productions are composed of substances which are variously constituted; their structure being filamentous, or areolar, or cellular, or both cellular and lobular, generally with numerous canals or cavities containing different kinds of fluids. In all, there is an admixture of solids and fluids in various proportions; the latter being either colourless, resembling serum, or more or less coloured, or altogether fluid blood. This structure may be so arranged, as to constitute either of the varieties of *sarcoma*, especially the *mammary* and *medullary* of ABERNETHY; or it may, owing to its softness, the delicate nature of its vessels, the tendency to hæmorrhagic infiltration, the rapidity of its protrusion through its ulcerated coverings, and to the occasional bleeding from its surface, form the true *fungus hæmatodes* of several modern writers. When it assumes this last appearance, it is more or less coloured, either in parts, or throughout, from the admixture of fluid or coagulated blood, collected into small circumscribed masses, or infiltrated into portions of its tissue. (See HÆMATO-CEREBRIFORM DISEASE.)

144. It may be remarked generally, respecting all the forms of organic change characterised by the deposit of either an unorganisable or organisable substance, that the specific matters entering into their composition have been detected in the lymphatics, in the glands, and in the veins proceeding from the diseased part. Pus, tubercular matter, melanoid matter, cerebriform matter, &c. have all been found in these situations; the consecutive appearances of the disease in other parts being thereby explained, even although—in respect of certain of these maladies especially—it may also occur in more than one part, coetaneously, owing to the diathesis, or general condition of vital manifestation; and previously to the absorption of any portion

of the morbid deposition, and to its consequent softening or destruction.

145. C. In respect of those *productions which are not only organised, but which possess an independent life*, and which constitute the *Entozoa*, I shall add but little to what I have stated elsewhere. They are found in all animals, either in the cavities, or in the parenchyma of organs: each of them having its special habitation—the *fasciola hepatica* in the liver, the *filiaria* in the cellular tissue, the *strongylus* in the urinary passages, and the *ascaris lumbricoides* in the intestines. They may be divided into three orders; the vesicular, the flat, and the cylindrical. Their organisation varies from a parenchymatous mass, or a cyst containing a limpid fluid, but without appendices, to that provided with one or more appendices, or with an evidently organised head; from this state, to a regularly formed structure, consisting of muscular fibres and an alimentary canal; and, ultimately, thence to a fully developed animal, possessed of sexual organs and the rudiments of nervous and circulating systems. LINNÆUS arranged the *entozoa* into the *intestinal* and the *visceral*. RUDOLPHI divided them into five classes, according to their form. CUVIER classed them into two orders; the *parenchymateux*, or those without any alimentary canal, and the *cavitaires*, or those possessing a digestive cavity. This last arrangement will be followed; inasmuch as in the article HYDATIDS will be noticed all those comprised in the *parenchymateux* of Cuvier, and under WORMS those belonging to the *cavitaires*.

146. As to the *origin* of the *entozoa*, much difference of opinion has existed, chiefly among German, French, and Italian writers. In respect of the first of the classes, viz. hydatids, little doubt can exist; but in respect of those that lodge in the intestinal canal, the case is otherwise. The subject, however, is sufficiently discussed in the articles referred to. But there is one important fact, which holds good in respect of the generation not only of hydatids and worms, but also of all adventitious productions and depositions; and which should not be lost sight of in devising means for their prevention and permanent removal, viz. that whatever depresses the manifestations of life throughout the frame—more especially those of healthy secretion and nutrition—will both favour their developement, and their increase or extension. These morbid formations may be even produced at will, by whatever lowers the vital energies;—by cold, moisture, unwholesome air and food; by a watery, vegetable, or impoverished diet; by the depressing passions; by exclusion of light or sunshine, &c.;—and not only may they occur singly under these circumstances, but they may also be complicated with various other maladies, of a constitutional or local kind, the nature of which may be thereby so far modified as to require a different treatment from what would be required in ordinary cases. Thus, complications of fever or of visceral inflammations with intestinal worms, are often the ultimate effects of long-neglected states of debility, and require less lowering measures than under other or usual circumstances, as well as differently appropriated remedies. Are we to suppose that, whilst the human œconomy is under the influence of the depressing causes



noticed above, the organic molecules are thereby prevented from being so perfectly assimilated, or so highly animalised, and indeed vitalised, as in health; and that, the vital attraction requisite to due nutrition being weakly or insufficiently exerted, they proceed to arrange themselves, according to the grade of vitality they possess, into much inferior beings in the scale of creation?

#### 147. vi. OF DESTRUCTION OF ORGANISED PARTS.

—This may take place in three ways:—1st. By interstitial absorption, by means of which the part is first *atrophied*, and afterwards altogether removed;—2d. By superficial absorption, or *ulceration*, which may be consequent on inflammation, or may proceed from the pressure of adjoining parts, and from loss of vital cohesion in circumscribed portions of membranes or superficial tissues;—3d. By *mortification*, owing to intense grades of inflammation, either absolutely or relatively to the state of local or general vital energy,—to a destruction of the nervous influence of the part,—to interruption of the circulation from disease of the vessels,—to pressure impeding both nervous power and vascular action,—and to generally depressed vital power, associated frequently with a morbid condition of the blood, and sometimes with diseased blood-vessels, or with external pressure: hence the readiness of the occurrence of any of the forms of mortification in old age, during dynamic and exanthematous fevers, from erysipelas, from deficient or unwholesome food, and from syphilis or mercurial cachexy;—and 4th. By the softening and swelling arising from the greatly diminished or lost vital cohesion of cellular and adipose parts, and their infiltration with a serous fluid (comprising the *Noma*, or *watery cancer*, of authors) giving rise to a form of disorganisation different from the foregoing, that often passes rapidly into a state of jelly-like solution and gangrenous erosion, particularly in the lips, cheeks, and genitals of children. A similar destruction sometimes also takes place in the stomach; and the true softening of the brain, in its extreme states, seems to be of the same nature. This species of disorganisation is intermediate between ulceration and gangrene. (See *ATROPHY, CELLULAR TISSUE, GANGRENE, SOFTENING, and ULCERATION.*)

148. V. CONNECTION OF MORBID ACTIONS AND OF ORGANIC LESIONS WITH STATES OF THE BLOOD.—Depressed and perverted states of vital power have been shown to be often connected with a deficiency or vitiated state of the circulating fluid, in chronic and cachectic diseases, and with excrementitious plethora, or the accumulation of the constituents of the various secretions in the blood in the early and advanced stages of fevers. (See *BLOOD, and DEBILITY.*) Primary excitement, in either its local or general forms, is often caused, or at least favoured, by *vascular plethora*; and reaction, or secondary excitement, with local determinations or inflammatory action, is frequently produced by this condition, existing either absolutely or relatively, or associated with the accumulation in the blood of the constituents of the secretions and excretions, owing to the interruption of these functions, as in the stage of reaction in fevers (§ 85.).

149. The connection of the *lesions of secretion* with the states of the *circulation* is one of the most important topics in pathology, and has

therefore been noticed in this (§ 95. *et seq.*) and other articles. The superabundance and transformations of one or two of the natural secretions are sometimes owing to the alteration, interruption, or suppression of others,—to the derangement of the balance of healthy action, and to the consequent plethora or vitiation of the circulating mass. Thus, morbid states of the cutaneous or of the intestinal secretions are often caused by inactive function of the kidneys or liver; and alterations of the urine, or of the bile, are frequently produced by suppression of the perspiration, or of the secretions from mucous surfaces. Morbid increase of the exhalations, particularly those poured into serous cavities, or into the areolæ of cellular parts, is, in many instances, connected with *general plethora*, as well as with *local congestions*, and deficient excretion; whilst the transition of congestions into inflammations, and the transformation of these exhalations into a fibrinous or fibro-albuminous substance, by sthenic inflammatory action, are promoted by the abundance of this constituent in the blood, and the general exuberance of this fluid. When the recrementitious secretions are imperfectly elaborated, owing to depressed vital power, the functions of chylification, sanguification, nutrition, and depuration are also impeded; the usual results being insufficient excretion, an impure state of the blood, and ultimately slow irritative fever, marasmus, anæmia, and other chronic diseases. In such cases the morbid phenomena proceed in a circle, or rather act and react upon each other, either until vascular excitement is produced by the state of the circulating fluid, and the secreting and excreting functions are thereby restored, as shown in the article *CRISIS* (§ 15.), or until some organic change supervenes. If we attempt to trace the procession of morbid actions, we shall often find that depressed vital power affects the secretions subservient to sanguification; these modify the quality, and ultimately the quantity, of the blood; the altered condition of this fluid disorders the vascular actions and depurating functions, whilst it further deranges the nutritious secretions; and thus the evil continues to increase until the living solids become changed, and incapable of performing their prescribed actions.

150. In connection with the various *lesions of nutrition* which have been brought into view, the blood can seldom long retain its healthy state. But the change is evidently, in the first instance, that of quality rather than of quantity, although it is very difficult to show in what respect the quality is modified. Excessive excretion and discharge will often, however, sensibly diminish the quantity of this fluid before any other change either in it or in the functions of nutrition becomes apparent. Local alterations of secretion and nutrition conjoined, whether originating in the organic nervous influence of the part, or in the quality of the blood circulating through it, ultimately change both the one and the other, and generally in a way that cannot be mistaken. In many instances the alteration of the blood is evidently owing to the absorption of the molecules which had been deposited, secreted, or combined in the morbid structure, and removed in the usual course of that transition of the solids into fluids, which obtains in the living economy, equally with the transition of fluids into solids. Animal



organisation is the complement of a process of combination and decomposition,—of attraction from, and dissolution into, the blood, of the constituents of the various tissues composing it; and if, in the former part of the process, the elements form heterogeneous productions, the dissolution of these productions, and commixture of their molecules in the blood, must necessarily vitiate both it and the structures through which it circulates. Accordingly we find, even in fevers, that the rapid absorption of a large portion of the molecules of the simpler or primitive tissues alters the circulating fluid often in a very evident manner; diminishes the density, cohesion, and bulk of many of the soft solids; and changes, at the same time, the colour, and other sensible properties, of both fluids and solids, to a remarkable extent. But as this resolution of a portion of the constituents of the textures into the fluid state, in fevers, generally takes place without any pre-existing adventitious formation or malignant production, the absorbed materials admit of removal by the emunctories without permanently contaminating the frame, or being deposited in various tissues or organs, and thereby increasing and extending the mischief.

151. In case of *chronic alterations of secretion and nutrition*, giving rise to various adventitious productions, whether local, constitutional, or malignant, the dissolution of the molecules that must necessarily take place (conformably with the law of organisation stated above (§150.), if they be organised; and owing to the irritation of the surrounding tissues, and consequent secretion of a fluid matter which dissolves them, and prepares them for absorption, if they be concrete and unorganised), and the passage of these molecules into the blood, will first vitiate it, and next diminish its quantity; at the same time that such of the molecules as are not quickly discharged by the emunctories from the circulation, will be deposited in other parts of the frame, forming consecutive productions of a similar nature. The consequences, therefore, of various local alterations of secretion and nutrition—as of pus, tubercle, carcinoma, &c.—will be,—1st, As respects the *absorbent system*—(a) the presence of a portion of the molecules of these productions in the absorbents proceeding from the parts in which they are formed; (b) irritation of these vessels, excited by the morbid molecules, especially where they ramify and reunite in the glands; (c) the accumulation of the morbid matter in the absorbents, or its deposition in the glands themselves: 2d, As regards the *blood and vascular system*—(a) the passage of the morbid molecules into this fluid, either directly by the veins, or more circuitously by the absorbents, or by both channels; (b) the contamination of this fluid; (c) consequent irritation or inflammation of the blood-vessels; (d) an imperfectly assimilated or deficient quantity of blood, owing to disorder of the recrementitious secretions, and of the functions of chyli-faction and sanguification: and, 3d, As respects the *soft solids*—(a) the deposition of the morbid molecules in the areolæ of the cellular tissue, or the infiltration of them into parenchymatous organs; (b) their secretion on the surface of serous membranes, or shut cavities, as those of the joints or bursæ; (c) their excretion on the mucous and cutaneous surfaces, with inflammation, softening,

ulceration, &c. of these surfaces, or of their follicles; (d) their excretion by glandular organs, either with or without inflammation and disorganisation of those organs.

152. VI. OF THE PROCESSION OF MORBID PHENOMENA.—i. *The Stages of Diseases* have been variously divided by pathologists. Some writers admit only three periods, viz. the *increase*, the *acmé*, and the *decline*; whilst others enumerate five, six, or even seven. The three stages now mentioned are sufficient to distinguish the principal changes of disease generally; but in respect of febrile diseases\*, they may be subdivided with advantage. A. [The *first* or *INCREMENTAL* stage consists of—(a) the *precursory period*, or the time that elapses from the impression of the exciting cause until the disease forms, or manifests itself in an evident manner. The characteristics of this period are generally languor, a diminution of the usual physical and mental energy, a weak or slow pulse, or irregular accelerations of pulse, slight chills, alternating with flushings or heat of skin; change in the countenance; and weakened power of the digestive, secreting, and excreting functions. In many instances, little or no complaint is made; or, at most, only a slight *malaise*, or indefinite feeling of indisposition, indicative of depression of the vital energies. This period is of very variable duration—from a few hours to two or three weeks—and is the same with the “*stadium opportunitatis*” of HILDENBRAND, the “*latent period*” of Dr. MARSH, and the period of “*incubation*” of the French pathologists.—(b) The *formative period*, or that of *manifest invasion*, comprises the time from which the commencement of the disease is usually reckoned, and critical evacuations expected. It is frequently attended by convulsions in young children; by syncope in females; and by chills, rigors, sickness or vomiting, pain, &c. in all classes of patients. These symptoms are generally accompanied by others, having a more especial reference to the nature of the disease which they usher in: as by aching pains in the head, loins, and limbs, in fevers; by acute pain and difficulty of breathing, in pleuritis; by vomiting, constipation, and pains about the umbilicus, in enteritis, &c.; and seldom continue longer than some hours.—(c) The period of *developed excitement*, or of *reaction*, or—if this pathological condition is not prominent—of aggravation of the chief symptoms: in which the pulse becomes quicker, fuller, and harder than in the former periods; the functions of digestion, assimilation, secretion, and excretion more or less impeded; the animal temperature and thirst commonly increased; and the tongue coated, &c. This period may continue only a few hours; or be prolonged to as many days, or even weeks, in sub-acute or local diseases. The whole duration of this stage is extremely various; but is usually much shorter in febrile than in local and organic diseases.—B. The *second stage*, or the *ACMÉ*, consists—(a) of the period of *stationary reaction*, in which the symptoms, having reached their height, remain in this state

\* This division of the periods of fevers, and an abstract of my opinions of their pathology, taken from my Lectures delivered from 1824 to 1829, was published in the *London Medical Repository* for Sept. 1827, p. 238. I state this, as similar views have been promulgated by others subsequently to this last date.



for an indefinite time — varying from a few hours to several days, weeks, or, in local maladies, even to some months — presenting slight modifications and vacillations, tending either to a favourable or unfavourable termination. — (b) Of the period of *crisis*, in which new phenomena appear, indicating either a salutary or fatal issue. The whole duration of this stage is, in febrile diseases, generally shorter than that of the first; but there are numerous exceptions to this rule. — C. The *third stage*, or that of *DECLINE*, consists — (a) of the *period of decrement*, or *exhaustion*, in which the symptoms subside more or less rapidly, and the vital organs begin to resume their functions, in favourable cases; or the energies of life to sink, in those of an opposite tendency. — (b) Of the period of *convalescence*, in which the remaining traces and consequences of the malady disappear, and the vital and animal functions regain their healthy condition and balance.

153. There may be some doubts of the propriety of adopting certain of the above subdivisions, as they are chiefly applicable to febrile diseases; but they likewise obtain in some other maladies. In those in which they are less remarkable — namely, in organic diseases — any division into stages can seldom be adopted with advantage, or be made otherwise than in an arbitrary manner. In these maladies, and, indeed, in some others, the second or formative period of the first stage may not be manifest; nor the second, or critical period of the second stage; and many may question the propriety of making *convalescence* a period of the disease. But I believe, that, during the restoration of the various functions, there still remain certain pathological states or degrees of disorder, requiring the attention of the practitioner; and, in many instances, a marked tendency to relapse upon exposure to the exciting causes of the malady. For pathological reasons, therefore, as well as on account of the future health of the patient, convalescence should be always treated as a period of disease.

154. ii. *Grades of Action*. — The terms *active* and *passive* have been much employed in pathology, and often without regard to precision. They should have reference only to the kind of vital action characterising disease, and not to its duration; with which, however, they have been too frequently confounded. Thus the term *active* has been often employed synonymously with *acute*, and *passive* with *chronic*. But, although an active disease is generally acute, it is not so always or necessarily, and may even be of a chronic duration; whilst the most passive maladies, as respects the grade of vital action, may be most acute with reference to their continuance. It should never be overlooked, in our appreciation of pathological conditions, that medical terms are only conventional or arbitrary signs, employed, often too indefinitely, to convey our ideas of certain ever-varying conditions of vital manifestation and organic change; and that, in using the words *active* and *passive*, we should restrict them entirely to the expression of grades of vital action, and view them as possessing an arbitrary as well as a relative import, inasmuch as there is every intermediate degree between the most active and the most passive states of disease.

155. iii. *Of the Type or Form of Disease*. —

The *type* is the order of succession observed to obtain among certain morbid phenomena; and admits of modification from various causes, without the intrinsic nature of the phenomena being essentially affected. It has commonly been divided into the *periodic* and the *continued*; the former being subdivided into several specific forms. — A. *Of the periodic type, and the periodicity of morbid actions*. — The intermissions or remissions of morbid phenomena, and their return or exacerbations after regular or nearly regular periods, constitute their periodicity; and are characteristic features of a number of diseases. These features are, however, more or less modified and marked in certain maladies than in others, in respect both to the paroxysms or accessions of morbid action, and to the intervals which separate them; and hence periodic maladies admit of various modes of arrangement, of which, however, that into the *febrile* and *non-febrile* (*pyrexial* and *apyrexial*) seems to be the preferable. The former are characterised by the regular stages of febrile action which the paroxysm presents in most instances, and the definite duration of the intervals or remissions: the latter are remarkable for the suddenness of attack, and their evident dependence upon, and affection of, the nervous system; as well as for the less regularity of their intervals. Of the various modifications, which these two classes of disease present, sufficient notice has been taken in the articles on *FEVERS*, and on the nervous disorders which possess this feature, especially *ASTHMA*, *EPILEPSY*, *HYSTERIA*, and *NEURALGIC AFFECTIONS*.

156. The *cause* of the periodicity of many diseases has never been satisfactorily assigned. Some have imputed it to the daily alternation of the erect and supine postures; others to the action of light, or, in other words, to solar influence. There is a certain tendency to periodicity in almost all diseases, in which the nervous functions are more or less affected, and even in convalescence: the remissions being often scarcely perceptible, and the exacerbations generally assuming the tertian type. The periodicity of morbid actions cannot be explained otherwise than by referring it to a law of the animal economy; and, as those maladies, in which the nervous systems are primarily and chiefly affected, are most remarkably periodic, we may infer that it is especially dependent on these systems. This law obtains to a certain extent in health, as respects the performance of many of the vital functions; its existence in disease, in a more evident or modified form, should not therefore be a matter of surprise, particularly when the functions of those systems on which it is more immediately dependent are principally affected. It is most distinct, and the intervals most complete, in maladies consisting especially of disturbance of the organic and cerebro-spinal functions, and in those in which the excretions are not much impeded, and the blood consequently not materially altered from the healthy state, or where the other causes to which the continued type is attributed (§ 157.) do not exist.

157. B. *The continued type* consists of an uninterrupted succession of the morbid phenomena, from the irruption of the disease to its termination. Some maladies present a nearly regular intensity during their course, and have therefore been called



by the older writers "*morbi continentes*." Others evince slight morning remissions, with exacerbations in the afternoon or towards evening: others, in addition to these, experience some degree of exasperation on certain, most frequently on alternate, days; and others, as some kinds of fever, assume at first a remittent form, but soon become continued, and at last again slightly remittent during convalescence. Even the more strictly continued febrile diseases evince a remitting or periodic type, in some degree, during decline or early convalescence. It would seem that a marked tendency to periodicity exists in all diseases, and that the continued type is imposed — (a) by a high degree of inflammatory action; (b) by impeded or interrupted secretion and excretion, and consequent alteration of the quality and quantity of the circulating fluid. Thence it may be inferred, that the type will be the more evidently continued, the greater the pathological states to which I have chiefly imputed it; and that, as in respect of other medical terms, *continued* or *periodic* are usually employed in an arbitrary manner, — the one type passing into the other, the regularly periodic and the continued forming the extremes of the scale, between which there is every grade, ascending from the former, or regularly intermittent, through the less perfect and the remittent, until the continued is reached.

158. iv. *Of the Duration of Morbid Actions.* — The period intervening between the actual irruption and the termination of disease is of very various length. Hæmorrhages sometimes continue only a few minutes, cholera a few hours, whilst asthma, rheumatism, and gout, may remain the greater part of life. Some maladies, originating in infection, have a specific duration, as small-pox, measles, typhus, &c. If we calculate from the time when the exciting cause made its impression, many diseases, whose length often appears definite, will present a much less uniform character. Thus, in plague and other pestilential maladies, the effluvium from the sick has sensibly affected the healthy, and terminated existence in a few hours from its impression, whilst other persons have not been seized by the fully formed malady until many days after exposure to its cause. Marsh miasmata have, in some instances, not produced ague until several weeks after their impression was made on the frame; and the rabid virus has sometimes not occasioned its dreadful effects until many months after its inoculation. If we comprise the time that elapses from the first manifestation of functional disorder, to its termination from fatal organic lesion, the duration of numerous diseases will not infrequently form no mean portion of the usually allotted period of existence. Some maladies of a slight and febrile kind, depending upon disturbance of the stomach or bowels, occasionally subside in a few hours, or in a day or two, and from this circumstance have been called *ephemeral*.

159. A. The terms *acute* and *chronic* are very arbitrarily employed to designate the duration of morbid actions; and, owing to the circumstances of their being often used as general but loose characteristics of disease, they have been mistaken by the inexperienced as indicating the existence of two forms, between which there is none intermediate. To this misconception medical writings have contributed, chiefly by de-

scribing merely these two conditions as simple and unvarying forms, instead of considering them as arbitrary signs employed to indicate the more extreme states, in respect of duration, between which there may exist every intermediate degree. Many employ these terms, to express not only the duration of morbid action, but also its grade or intensity. Of this little need be complained, if the meaning attached to the words be previously assigned. Numerous writers, impressed with the vague manner in which these appellations have been used, have endeavoured to give them a greater degree of precision by adjoining qualifying epithets to them. — (a) Diseases have been generally viewed as *acute*, when they are not prolonged beyond forty days; some writers subdividing those thus characterised, into the "*most acute*," when they terminate in three or four days, — into the "*very acute*," when they do not continue longer than seven days, — into the "*simply acute*," when they endure for fourteen days, — and into the "*sub-acute*," when they reach forty days. — (b) Maladies which are prolonged beyond the last term have been usually designated *chronic*; but they hardly admit of a similar subdivision to the above, their duration being indefinitely prolonged. The subdivision of them into *functional* and *organic*, if the distinction could be made during life, would be of practical importance; but, although it might be made in diseases of some organs, it cannot so readily in respect of others: besides, most chronic ailments are first functional, and so gradually and imperceptibly run into organic change, that no line of demarcation can be drawn between the two states.

160. VII. OF THE TERMINATIONS OF DISEASE. — Morbid actions end ultimately in two ways: 1st, In health; 2d, Death. But before terminating in either, they may assume other forms, or altogether distinct characters; giving rise to what may be called the succession, the transition or conversion, and the metastasis of disease. — A. *The return to health* consists in the restoration of all the functions. It takes place in ways peculiar to the nature of the malady, and consequently in very diversified modes. — (a) In *local diseases*, and in those simple pathological states consisting of debility, excitement, exhaustion, &c., the terminations in health are the most direct. Nervous affections and hæmorrhages commonly end by the mere cessation of the phenomena of which they consist; and a similar occurrence obtains in respect of simple congestions and various functional complaints, as jaundice, disorders of the stomach and bowels, &c. In the restoration, however, of inflammations to the healthy state, the changes are more numerous, the various phenomena of which this lesion is composed either disappearing in succession and gradually, that is, in *resolution*; or giving rise to other alterations of a more or less serious or disorganising kind; and these to new secretions and states of nutrition, as purulent collections, ulceration, sphacelation, and ultimately to the productions of coagulable lymph, granulations, and cicatrisation. — (b) In *febrile* and *constitutional* maladies, the return to health is generally the result of a series of changes in the economy, however rapidly it may take place; and is usually characterised, *first*, by the subsidence or



exhaustion of the morbid state constituting the chief pathological condition, and, *second*, by the restoration of the secreting and excreting functions, the interruption of which constituted one of the chief features of disease. (See *CRISIS*.) — (c) In *organic lesions*, the restoration of the health is less frequently effected, either by nature or by art, than in the preceding classes of disease, and is usually the result of modifications of the secretions and nutrition of the part different from those in which the organic alterations originated. Consequently the return to the natural structure is generally slowly, and often only partially, accomplished, — is always aided by a due manifestation of the vital energies and performance of the secreting and excreting functions, — and is frequently favoured by irritation of, and derivation to, some remote tissue or viscus, occurring spontaneously or excited by art.

161. In all diseases, the restoration to health is as much owing to the vital energy, as to subsidence of the particular morbid actions which constitute them. Thus, acute or sub-acute inflammations occasion various changes of structure; yet the mere disappearance of the inflammation does not constitute the return to health. The organic lesions still continue; but these are ultimately removed in the course of that constant process of attraction from, and dissolution into, the blood, of the special molecules of the tissues. Secretion and nutrition have been shown to be not the mere deposition of organic particles, but a constant circulation of these particles from the blood into various fluid and solid forms, and back again into the blood, after having retained these forms for a longer or shorter period: and, as the organic molecules are identified with the various structures, in virtue of the vital influence and attraction which actuate these structures, it follows that the more this influence is exerted, the more will nutrition be perfected, and any aberration from the healthy form avoided and restored. Consequently, in the course of this process, the natural type of formation will be preserved, and any morbid production be removed. — (a) Various phenomena (*critical changes*) of a very marked character indicate the termination of acute diseases in health; and have received, from their importance, the attention of physicians. (See *CRISIS*.) — (b) As the functions become re-established and the pathognomonic symptoms subside, and at last disappear, so the decline of disease passes into *convalescence*, in which, at first, more or less of the phenomena constituting the disorder, and of debility, not merely of the organ chiefly affected, but also of the rest of the frame, still remain; the functional or the organic lesion gradually disappearing as the manifestations of life throughout the system become more and more developed, or attain their healthy state and balance. (See *DEBILITY*, § 43.)

162. B. The *termination in death* takes place in various ways, both in *acute* and *chronic* diseases. It may occur in the *former* more or less suddenly — (a) from rapid sinking of the vital powers, as in adynamic fevers; (b) or from fatal hæmorrhage before exhaustion has reached its utmost, as in some diseases of the lungs and digestive canal; (c) or from pressure on, or interrupted circulation through, the brain, accompanied with convulsions, or coma, or with both, as in various diseases of this organ; (d) or from profound or prolonged

syncope and sudden cessation of the heart's action, as upon quickly assuming or retaining the erect posture in states of exhaustion; (e) or lastly, from *asphyxy*, as pointed out in that article. Death may also occur much more slowly in acute maladies, owing to the gradual sinking and abolition of the vital manifestations; giving rise to the collapsed countenance, the frequent, weak, and unequal pulse and respiration; the loss of animal heat, and cold clammy perspirations, the resolution of the sphincters, and insensibility, the cadaverous smell, &c. observed some hours previously to, and ushering in, dissolution. In some *chronic* maladies, death often occurs suddenly, as in organic diseases of the heart, large blood-vessels and lungs, owing to effusion into the pericardium, interruption of the heart's contractions, to rupture of its cavities or valves, to bursting of aneurisms or profuse hæmorrhages, to suffocation from effusion into the bronchi, or into the pleural cavities, &c. More frequently, however, death takes place slowly in this class of maladies; and is chiefly owing to the exhaustion of the vital energies, or to the disorganisation of some important part, and the interruption of a vital function, disordering and ultimately obstructing others; as when fluid is slowly effused in any of the large cavities.

162. VIII. OF THE RELATIONS, SUCCESSIONS, AND COMPLICATIONS OF DISEASE. — 4. The relations of disease are not easily explained in many instances; in others, however, they are more obvious. It cannot be shown wherefore a state of erethism, or inflammatory irritation of the digestive mucous surface, should frequently co-exist with acute or chronic eruptions on the skin otherwise than by supposing that the state of the circulating fluid is such as to excite or irritate the vascular reticulations of both the skin and villous membrane; and, although this fluid may be in excessive quantity in the majority of such cases, yet quantity merely will not account for the phenomena, without calling into aid an alteration of quality; which, while it excites the digestive mucous surface, also inflames the cutaneous vessels, during the depurating process they exert upon the blood. But the state of this fluid will not explain all the relations of complicated morbid actions. The reciprocative influence of the organic nervous and cerebro-spinal systems, and of the former and the vascular systems, must be considered as the earliest and chief sources of morbid associations. When the dependence of vascular action and of the secreting and excreting functions on the organic nerves, — of the conditions of the circulating fluid on the states of these functions, — and of the cerebro-spinal manifestations on both the organic nervous and vascular systems — on the strictly organic actions, — is duly considered, the relation and succession of several morbid conditions will appear as necessary results of this union. When we perceive the processes of digestion, secretion, and defecation imperfectly performed — processes essentially dependent upon the organic nervous influence — should we be surprised to observe further disorder supervene? and are we not rather to expect morbid phenomena to present themselves, referrible to the vascular system, to the circulating fluid, to the nutritive functions, and to the purely animal manifestations? When important eliminating processes are either impeded or increased



to such a degree as to constitute disorder, ought not other states of disease to be looked for? When the urinary secretion is interrupted, excrementitious vascular plethora, followed by a morbid increase of the exhalations, dropsy, congestion or effusion on the brain, convulsions, coma, &c. will necessarily follow. When this excretion is morbidly increased, the other secretions will be diminished, and assimilation and nutrition impeded. When the menstrual discharge is delayed or suppressed from torpor of the generative organs, an important depurating function is not performed, the co-existent debility of all the organic actions is thereby increased, the cerebro-spinal functions are weakened; ultimately assimilation and nutrition are reduced to the lowest grade, and anæmia and marasmus supervene. But when this discharge is copious and frequent, owing to increased action or excitement of these organs, the blood is purged of its impurities, all the organic functions assume a proportionate activity, and the cerebro-spinal system evinces augmented susceptibility and excitability: sanguification and frequently nutrition proceed rapidly; and vascular plethora, with a tendency to local determinations, to inflammations, to hysteria, to convulsions, &c., is the consequence, particularly upon any interruption of the discharge.

164. *B.* Also, when morbidly increased secretions have become habitual, other and more important diseases may succeed any interruption they experience. An habitual diarrhoea, when suppressed, may be followed by peritonitis or ascites; an old bronchorrhoea, or chronic bronchitis, may, when arrested, be succeeded by hydrothorax; leucorrhoea, or menorrhagia, if injudiciously treated, may pass into inflammation of the womb, or of the peritoneum, and even into ascites. In these the succession of morbid actions admit of ready explanations; for these morbid secretions or discharges being generally the result of local determination and plethora, their interruption or suppression merely changes their direction from a surface, whence they were evacuated, and where they, consequently, were comparatively innocuous, either to the substance or to the surface of the organ or part affected, where their retention and accumulation occasion dangerous or fatal effects.

165. *C.* Whilst the mutual dependence—the reciprocative influence—of the different systems and functions of the frame, explains the relations and successions of diseases, it also accounts for their *complications*, and for the comparative infrequency in practice of those simple or specific forms or states of morbid action described by nosologists. Indeed, when we reflect on the intimate manner in which the various parts of our frame are anatomically related and functionally dependent, we should rather be surprised to find disease so simple as it often is, and be prepared to observe not only associated lesions of structure and disorders of function, but also the one variously complicated with the other. There are numerous circumstances which favour the complication of disease. Amongst these the following are the most important:—1st. Constitution and diathesis,—as the scrofulous, the rheumatic, the gouty, the plethoric, and the debilitated;—2d. The nature of the predisposing and exciting causes, viz. those which act upon the organs

in general, as impure air, unwholesome food, &c.;—3d. The state of the secretions and excretions, particularly the vitiation or interruption of them;—4th. Vascular plethora, anæmia, and a morbid state of the blood;—5th. The disposition of membranous or continuous parts to experience an extension of morbid action, particularly when vital resistance is weak, and the excretions unnatural or interrupted;—6th. The influence of irritation of a part upon remote organs, through the medium of either the organic or cerebro-spinal nervous systems;—and, 7th. Injudicious treatment. It would be inconsistent with my limits, were it possible, even to enumerate the complications which result from these and other causes; but there are certain *illustrations* required to show the truly practical importance of this branch of pathology.

166. (*a*) Tubercular productions in the viscera, or in the membranes, often co-exist with disease of the absorbent vessels and glands. Rheumatism and gout not merely modify the character of other diseases, but may seize on a number of parts successively, and even on several simultaneously, whilst they are very often associated with a torpid state of the liver and bowels, and disorder of the stomach and urinary organs. A plethoric state of the vascular system, whether absolute or relative, associates congestions of internal viscera with various disorders of secretion and excretion; with affections of the nervous system, and of the female generative organs, and sometimes with eruptions on the skin. Debility disposes to the extension of inflammatory action to continuous or contiguous parts, and associates disorders of the digestive and assimilating viscera with those of the nervous system and sexual organs; and thus examples of the *succession and complication of disease from diathesis and constitution* (§ 165, 1st.) are constantly appearing in practice.

167. (*b*) Extremes of temperature, and humidity, and impure air often seriously affect more than one organ. A warm and impure air frequently produces, either successively or simultaneously, not only functional but also structural disease of the liver, spleen, and bowels, as well as fevers in which these viscera and the stomach are principally affected. Unwholesome food contaminates the chyle, the circulating and secreted fluids, and ultimately occasions co-existent disease of several viscera,—the *complication of causation* (§ 165, 2d.).

168. (*c*) A vitiated, copious, or interrupted state of one or more secretions not only affects the organs which produce them, and the viscera to whose functions they are either directly or indirectly subservient, but also vicariously influences other secretions, and changes their quantity or quality. A copious flow of acrid bile may complicate disease of the liver with inflammation of the mucous surface of both the stomach and the intestines, particularly of the latter; and functional disorders, or inflammations, or structural change of the kidneys, may so alter the conditions of the urine and blood as to associate with them either renal and vesical calculi, or inflammation and structural disease of the urinary bladder, or dropsy of one or more of the shut cavities, and of the cellular tissue. Also, interrupted discharge of the secretions, particularly of those that are excrementitious, from disease of their outlets, not



infrequently occasions consecutive changes in the organs which elaborate or retain them. Obstructions to the due evacuations of the urine, from obstacles existing either in the urethra, or about the neck of the bladder, or in the ureters, superinduce alterations of the kidneys, or of the bladder itself; and disease of the biliary ducts commonly associates with it lesions of both the gall-bladder and liver, and of the digestive canal; furnishing examples of *superinduced complications* (§ 165, 3d.).

169. (d) Changes in the quantity and quality of the circulating fluid, especially when carried far from the healthy state, although usually the consequences of disorder of one or more of the secreting and assimilating viscera, yet become the causes of co-existent disease of several organs and structures, modifying their interstitial secretions, their nutrition, and their vital cohesion and manifestations; the whole organisation generally presenting more or less of change. These complicated effects may assume varied forms, and implicate particular organs in a more remarkable manner than the others, according as either plethora or anæmia may be associated with the accumulation of excrementitious matters in the blood, or as the quantity and nature of these matters may vary—thereby causing diversified *humoral complications* (§ 165, 4th.).

170. (e)—*α*. When we advert to the circumstance of disease essentially the same having different symptoms, and producing varied effects, merely in consequence of a slight difference in its seat, one reason for the frequency of what should be called rather the extension or succession of disease, than its complication, will be apparent. Thus, when inflammation of the fauces extends down the trachea and bronchi, there may be either a succession of disease, if the inflammation disappears from the former seat as it extends to the latter; or a complication, if it exist at the same time in all; and yet the nature of the morbid action is essentially the same, as long as the vital energies remain unaltered. When inflammation extends along the digestive mucous surface, or to distinct parts of it only, a similar succession or complication, but without difference of the nature of the disease, also obtains. These are instances of the *succession or complication of continuity*.—*β*. But disease may extend from one tissue to another, instead of being thus limited to the same, as in the above instances;—it may originate in a membranous surface, and involve the substance or parenchyma of an organ, and ultimately even its opposite and differently organised surface, and either disappear from the former upon affecting the latter, or implicate them all simultaneously, thereby giving rise to a succession or complication of morbid actions, without altering their characters, although materially changing their symptoms. Thus, bronchitis may pass into pneumonia, and this latter into pleuritis, or they may all co-exist; and inflammation of a part of the digestive mucous surface may be extended to the cellular tissue connecting the coats of the alimentary tube, and thence to the peritoneum; and so on in respect of other organs, which, equally with these, not infrequently furnish examples of the *succession or complication of contiguity* (§ 165, 5th.).

171. (f) Irritation and other disorders of an organ or part not infrequently associate with them

a morbid condition of remote as well as adjoining parts. Worms in the intestinal canal often induce either febrile or convulsive affections, Congestion, inflammatory irritation, erethism, or merely functional excitement of the female organs, may occasion epilepsy, irregular or anomalous forms of convulsions, hysteria, altered sensibility of the nerves—referred by some writers to irritation of the spinal chord—vitiated appetite, and disordered manifestations of mind. Injury of a tendon or nerve may produce tetanus; and the accumulation of fæcal matters in the large bowels may excite, and be complicated with, various disorders of the stomach, inflammation and ulceration of the fauces and pharynx, febrile disturbance, hæmorrhoids, numerous nervous ailments, and disorders of the uterus. These may be termed the *sympathetic associations or complications of disease*.

171. (g) That injudicious treatment often complicates disease, may not be so readily admitted as the circumstances now adverted to. But I can state, as the result of observation, that lowering measures carried too far will occasionally favour the extension of disordered action and structural change, either by continuity or contiguity (§ 170.), or by promoting the function of absorption, and the passage of morbid matters into the blood (§ 169.); and that stimulating remedies used too freely will, either by their operation on secreting organs and surfaces, or by irritating the parts to which they are applied, sometimes superinduce inflammatory action in addition to the disease which they were intended to remove. Thus, arsenic exhibited too freely, in order to cure agues, has produced inflammation of the internal surface of the heart and arteries; and bark or quinine, given freely before morbid secretions and fæcal matters have been carried off by purgatives, has superinduced hepatitis or dysentery, or both, upon the intermittent disease for which it was prescribed. Stimulants and tonics taken in some forms of dyspepsia, as complicated functional or structural disease of the stomach, liver, and bowels; and astringents imprudently employed, have excited inflammation in the organ whence the discharge, for which they were exhibited, proceeded, as well as disease in some related organ.

172. IX. OF THE METASTASIS OF DISEASE.—*Metastasis* (μετάστασις, a change, migration, from μεθίστημι, I change, or transfer) of disease has been often improperly confounded with the terms *Metaptosis*, *Epigenesis*, *Diadoxis*, and *Metaschematismus*, which have had different meanings attached to them. *Metaptosis* has usually been used to mean a change in the nature or state of a disease, without a change in its seat;—*Epigenesis*, the superinduction of another, upon an antecedent, disease; the anterior affection not being ameliorated by the occurrence;—*Diadoxis*, the succession of a less, to a more, important malady;—*Metaschematismus*, the transformation of disease simply;—and *Metastasis*, the displacement or disappearance of disease from one part of the frame, and its seizure of another of more vital importance. It will be perceived, that the phenomena which these terms have been employed to express, have been already noticed, excepting those which fall under the last. When rheumatism or gout disappears from a joint and attacks the head, heart, or stomach; or when erysipelas, or any febrile or chronic eruption, forsakes the surface and is fol-



lowed by angina, or pneumonia, or internal abscess, or inflammation of the alimentary canal, or peritonitis; there is a metastasis, or change of the seat, of the disease.

173. *A.* There are certain topics connected with this subject, which have been much discussed, viz. Whether the disappearance of disease from its original seat is the consequence, or the cause, of its seizure of another part; and through what channel does the transfer take place. The abettors of the humoral pathology explained the occurrence of metastasis, by considering that a transfer of the *materies morbi*, or morbid matter, takes place from one part to another, through the vascular system; and that the consecutive disease is generally the consequence of the disappearance of the antecedent. The supporters of solidism, whether with reference to nervous influence or to the doctrine of excitability, supposed that disorder manifests itself in the new seat owing to its suppression in the old,—the cerebro-spinal nervous system being the medium of displacement; whilst they admitted—particularly the disciples of BROWN—that its irruption in the former frequently subdues it in the latter, owing to the excitability being more intensely acted upon in the one than in the other. A greater desire, however, has been displayed by either class of theorists, to conform facts to their views, than to investigate the matter in a legitimate manner. In order to draw accurate inferences, it is necessary to interrogate Nature herself, by an intimate observation of the phenomena to which the term metastatic has been applied; and, when the practical importance of this subject is considered, the results will repay the investigation. A few facts which have fallen under my observation will serve to elucidate the subject.—1. A medical friend had gout in the lower extremities, for which he took a large dose of colchicum before the morbid secretions had been evacuated. He almost instantly had a violent attack of the disease in the stomach, with simultaneous disappearance of it from the original seat. The free use of stimuli caused it to relinquish the stomach, and to reappear in the extremities. In this case, the transfer from one place to the other was instantaneous; the medium being evidently the nervous system.—2. Another patient had, upon suppression of gout from the lower extremities, an attack of simple apoplexy, for which he was bled and purged. When I saw him, he was still comatose. The head, however, was cool. I directed mustard cataplasms to the feet, and camphor and ammonia internally. The gout suddenly reappeared in the feet, and at the very same instant he awakened as if from a profound sleep, evincing not the least cerebral disturbance, organic or functional.—3. A middle-aged and not robust man had most severe rheumatism in the thighs and legs, for which he took a large dose of croton oil, which produced hypocatharsis, and the complete cessation of the pains of the limbs, followed by the most distressing agony referrible to the heart, with palpitations, &c. He was actively treated, but he died in a day or two. With the exception of a somewhat increased vascularity of the substance of the heart, no disease could be detected in any part of the body.—4. A female, about 30, sanguine and plethoric, had rheumatism of the lower extremities, which she attempted to remove by a quack embrocation. The disorder disappeared

from the extremities, but she was instantly seized by most acute pains and tenderness in the region of the uterus and ovaria, the latter being greatly enlarged, so as to form small tumours. Similar cases to the above have been observed by me, and show that rheumatic and gouty diseases, when suppressed in one part, or suddenly subdued by lowering remedies or evacuations, will often be manifested in some vital organ, and be removed from it, in such a way as can be explained only by nervous agency: and, when the conformation of the parts consecutively affected are considered, and the proneness of the disease thus superinduced to assume an inflammatory and congestive state, retaining at the same time the gouty or rheumatic character, is taken into account, it is reasonable to suppose that the organic nerves are the chief channel of transfer, and seat of the affection; their intimate anatomical connection with the blood-vessels explaining the morbid state of vascular action with which the transferred disease is so frequently accompanied.

174. *B.* But there are metastases of a somewhat different kind from the above; but which, equally with these, present morbidly excited action: the difference consisting chiefly in the extreme degree in which sensibility is altered in those already noticed. In the exanthemata, and even in the course of several chronic eruptions, the cutaneous affection suddenly disappears, and dangerous disease is developed in an internal organ. In some cases, the superinduced malady is merely the localisation or determination of the morbid action to a single organ, the external affection disappearing in consequence—a result not infrequently of depression of the powers of life, or of irritants acting upon the part thus secondarily diseased, or of both causes conjoined. In other instances, particularly in chronic eruptions and discharges, the internal or consecutive malady is the consequence of the suppression of the external disorder. In order to form an opinion relative to the nature of metastasis in exanthematous diseases, it is necessary to attend to the following circumstances:—1st. That they are frequently caused by the neglect of sufficient evacuations early in the disease, by a cachectic habit of body and constitutional vice, by breathing a foul air, and by injudicious regimen;—2d. That whatever suddenly lowers the nervous energies, or weakens vital resistance to hurtful agents, or perturbs the frame, will often cause a metastasis of the disease;—3d. That the metastasis may be either complete, the external eruption disappearing entirely; or incomplete, the eruption still partially remaining. In these diseases, the morbidly excited vascular action of the skin evacuates a peculiar matter, which is capable of propagating the disease, and which is either carried off chiefly in the insensible perspiration, as in measles and scarlatina, or in the more consistent matter of the eruption, or in both, as in small-pox. When, therefore, the morbid vascular action and its attendant evacuation are either prevented from appearing in, or suppressed from, the cutaneous surface, it may be reasonably inferred that they will be determined to some internal viscus, giving rise to inflammation of, and serous effusion from, mucous or serous surfaces; and congestions, infiltrations, inflammation or hepatisation of parenchymatous organs. Thus, in scarlatina, measles, small-pox, erysipelas,



&c. the suppression of the eruption not infrequently produces one or more of the above effects, and constitutes the chief diseased appearances in fatal cases.

175. C. There is another form of metastasis, that consists chiefly of morbid secretion; and although vascular action is concerned in producing the matter found in the secondary seat of disease, still the transfer from the original seat evidently takes place through the channel of the circulation. We not infrequently observe purulent or ichorous matter, which has been formed in one part, removed from thence, and infiltrated, or secreted and accumulated, in another part; occasioning consecutive abscesses (see *ABSCCESS*), or some other structural change, in a parenchymatous organ, or puriform effusion into natural cavities. In these cases, the passage into, and presence of morbid matter in, the blood, excite increased vascular action in some part by means of which it is either evacuated from the system, if the morbidly excited part be an emunctory; or infiltrated and collected, if it be a parenchymatous organ; or effused and retained, if it be a serous or synovial cavity. Thus, collections of puriform matters have been found in the liver, in the joints, in the lungs, in the brain, &c. after small-pox, erysipelas, fevers, inflammations of veins, or of remote or external parts, and after fractures; and often without any antecedent disease of the viscera thus consecutively disorganised, or disorder referrible to them, proportionate to the extent of disorganisation observed on dissection of fatal cases.

176. D. From the foregoing I conclude, 1st. That metastases may be divided into—(a) those manifesting fully expressed disordered action, in which the sensibility is more or less excited; and (b) those consisting of latent disorganisation, and produced chiefly through the medium of the circulating fluid: or into—(α) those which affect the substance of an organ; and (β) those which take place to an excreting surface or viscus—as the skin, the intestinal mucous surface, the kidneys, and the salivary glands—and which frequently terminate favourably by evacuation from the circulation of noxious matters that were the chief cause of the metastasis.—2d. That they are brought about—(a) by means of the organic nervous system, as in gout and rheumatism;—(b) by the influence of this system of nerves upon the blood-vessels and capillaries, determining to various surfaces or structures a preponderating degree of morbid action and its results, according to the operation of numerous intrinsic and extrinsic causes, as in exanthematous metastases;—(c) by the absorption of hurtful matters into the circulating current, where they excite, internally as respects the capillaries, the increased or morbid action of some secreting surface or emunctory, or occasion the disorganisation of some predisposed parenchymatous organ.

177. X. THE CIRCUMSTANCES MODIFYING THE FORM, COMPLICATIONS, DURATION, AND TERMINATIONS OF DISEASE, are as numerous as the causes,—predisposing, exciting, and determining,—in which it originates. The constitution and diathesis of the patient; a cachectic or vitiated habit of body; the continued operation, during the course of the disease, of the causes which induced it; the depressing passions; impure or stagnant air; all sudden mental and physical per-

turbations; extremes of temperature; injudicious treatment and regimen; the use of medicines which either suddenly or intensely excite, or depress, the vital or nervous energies, and weaken the restorative powers; neglect of evacuations, and of the state of the secretions and excretions; the *nimia diligentia* of the practitioner, or improper interference with the salutary processes of nature, and with critical evacuations and changes; the too early recurrence to a full or stimulating diet, or exposure during convalescence to any of the causes specified above; will not only modify the states and duration of disease, but also occasion the *succession* of one disease into another, render morbid action more or less complicated, transfer it from one structure or organ to another, and occasion *relapses* of greater or less severity. (See *PHYSIC—Practical Principles of*; and *SYMPTOMATOLOGY*.)

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DROPSY. — SYN. ὕδρωψ, *Th.* (ῥῖδωρ, water, and ὥψ, aspect, appearance). *Hydrops*, Lat. *Hydropisie*, Fr. *Die Wassersucht*, *Die Hydropsie*, Germ. *Idropisia*, Ital.

CLASSIF. — 3. *Class*, Cachectic Diseases; 2. *Order*, Intumescences (*Cullen*). 6. *Class*, Diseases of the Excremental Function; 2. *Order*, Affecting Internal Surfaces (*Good*). IV. CLASS; I., II., and III. ORDERS (*Author*).

1. NOSOL. DEFIN. *The accumulation of watery fluid in the natural cavities, or in the cellular areolæ, or in both, causing distension, impeding functions of the affected and adjoining parts, frequently with fluctuation, softness, &c.*

*PATHOL. DEFIN.* *A collection of fluid arising either from increased exhalation or from diminished absorption, each of which conditions depend upon antecedent states of disease.*

2. After having taken a general view of the nature and treatment of dropsical effusion — of Dropsy in its generic acceptance, — I shall proceed to consider its specific forms. By thus viewing, in a connected manner, the various species of dropsy, which have been improperly separated the one from the other, much unnecessary repetition will be avoided, and several advantages obtained.

3. I. PATHOLOGY OF DROPSY. — i. *Brief Historical View of Opinions.* — Different views of dropsical diseases may be found in several parts of the writings ascribed to HIPPOCRATES. There can be no doubt, however, of the connection between them and a state of active vascular disorder, as well as of obstructions of the liver and spleen, having been known to him. ERASISTRATUS is said to have referred these maladies chiefly to engorgements of the liver; and ASCLEPIADES to have viewed them as being either acute or chronic. ARETÆUS gave merely a lively description of the history of dropsies: but GALEN, in the unconnected observations on these maladies scattered through his writings, stated some just views of their nature. He pointed out the seat of the ascitic effusion; contended, in opposition to

ERASISTRATUS, that dropsies often depend upon other causes, and upon disease of other viscera, beside hepatic obstruction; and that they frequently proceed from a morbid state of the blood. CÆLIUS AURELIANUS assigned, as their causes, lesions not only of the liver, but of the spleen, of the womb, and of the large and small intestines. AËTIUS made some reference to a cachectic habit of body in relation to them; and ALEXANDER of Tralles noticed, but in a superficial manner, their connection with diseases of the lungs, and with antecedent fevers and inflammations.

4. Amongst the Arabian writers, little respecting dropsy beyond what is contained in the works of their predecessors is to be found. AVICENNA, however, attributed it to the liver and to the kidneys; and stated that the latter, owing to the coldness or warmth of their temperature, or to obstruction or induration of their structure, fail to attract or separate the watery fluids. MESUË gave a similar view to the foregoing, and both agreed in stating that the liver does not concoct pure, but a watery and phlegmatic, blood. When we reflect that the lights of modern science have shown that the liver is both indirectly and directly concerned in sanguification, that the crasis and vital constitution of the blood is really affected in many states of dropsy, and that the kidneys are often very demonstratively diseased, and in a way that may be expressed in general terms nearly similar to those used by AVICENNA, we must conclude, that some of the pathological opinions of the ancients are not so despicable as many of the moderns suppose; and that, even in recent, as well as in bygone, times, there have been more absurd theories than sound views of morbid actions, and a greater disposition to generalise from a few imperfectly ascertained states of disease, than to take into account numerous concurrent circumstances and morbid associations.

5. Since the revival of learning, but little was added to the knowledge of dropsies, until the writings of WILLIS appeared. This very eminent physician first called in the state of the vessels to the explanation of these diseases; and argued that, whilst the vascular extremities are either too relaxed or too constricted, causing thereby an increased effusion and diminished absorption respectively, the blood itself is often altered, and its circulation impeded by scirrhus tumours, tubercles, and obstructions in any of the abdominal viscera. ETTMULLER and LISTER adopted the views of WILLIS. The experiments of tying the veins, first performed by LOWER, confirmed the opinion promulgated but not carried its due length by WILLIS, that interruption of the venous circulation is a chief cause of dropsical effusions. F. HOFFMANN repeated the experiments of LOWER, and, as well as BOERHAAVE and VAN SWIETEN, admitted the importance of venous obstruction in the pathology of dropsies. MORGAGNI says, "Quæcunque causa diutius potest sanguinis aut lymphæ cursum morari, aut humoris quo cavæ corporis madent, aut secretionem augere, aut exitum deinde imminuere morbo huic potest originem præbere." LUDWIG first directed attention to an atonic state of the vessels as a principal source of those maladies, and his contemporary MILMAN assigned as their chief causes a laxity of the fibres, exhausted power arising from copious evacuations, and acute diseases passed into the chronic state,



and an obstacle to the return of the blood through the veins. The views of HALLER were nearly those of LUDWIG and MILMAN; but he considered not only that the mechanical obstruction, but also that that grade of debility of the veins, which would retard their circulation, would occasion dropsies. The opinions of D. MONRO and CULLEN coincided with the foregoing; the former considering, and indeed proving by experiment, that the notion entertained at the time he wrote, as to rupture of the lymphatics being a cause of the effusion, was not well founded.

6. When lymphatic absorption became generally insisted upon, owing to the writings of HUNTER, HEWSON, and others, an additional cause of these maladies was acknowledged, and, as might have been expected, the part assigned to these vessels was greater than they perform. VOGEL applied the doctrine of atony to them; and most of his contemporaries entertained a similar view. SOEMMERRING, WEDEL, ASSILINI, and MASCAGNI, nearly altogether deprived the veins of their share in the production of aqueous effusion, and assigned its source almost entirely to the lymphatics. These writers, with many of their predecessors, still conceived that the rupture of these latter vessels sometimes caused it, and adduced cases in which this lesion was detected on dissection. MASCAGNI considered that, besides other alterations, the absorbents are either obstructed in their glands, or dilated to such an extent as to prevent their valves from opposing the reflux of the fluids absorbed by them. The untenable hypothesis of a retrograde action of these vessels was advanced by MEZLER and DARWIN, but found no support.

7. The division of dropsies into *active* and *passive*, or *acute* and *chronic*, may be traced to RIVIÈRE, or RIVERIUS, who denominated them *hot* and *cold*. BOERHAAVE, BACKER, TISSOT, STOLL, and later writers, have given greater precision to this division, by denominating the former plethoric, active, sthenic, and inflammatory, according to the state of the circulation and of vital action. It was, however, chiefly TISSOT, STOLL, and J. P. FRANK, who drew attention to active, plethoric, or acute dropsy; and GRAPENGIESSER, the pupil of FRANK, BLACKALL, FAUCHIER, POILROUX, BRESCHET, ABERCROMBIE, and AYRE, have further illustrated this doctrine. GRAPENGIESSER, with much justice, observes, “*Omnis, enim, inflammatio modica si organon secernens occupat, functionem ejus auget.*” GEROMINI, a recent Italian writer, carried the inflammatory origin of dropsy as far as a medical sectarian might have been expected to have done, and discarded venous obstruction from any share in the production of this lesion. The facts, however, which have been adduced by Dr. D. DAVIS, M. BOUILLAUD, M. VELPEAU, and Dr. R. LEE, demonstrate the important part obstruction of the veins performs in the causation of at least partial dropsies; and the interesting researches of Dr. BRIGHT, followed up by Dr. CHRISTISON and Dr. I. GREGORY, disclose the great share the kidneys have in occasioning this class of diseases. As to the existing state of our knowledge of their pathology, fuller details will appear in the sequel.

8. ii. OF THE CAUSES OF DROPSIES.—It is evident that the chief causes of these diseases are the pre-existing lesions which will be hereafter

described. But there are others, more remote in their operation, which deserve to be succinctly noticed.—*A. Remote causes.*—*a. The predisposing causes* are chiefly a cold and moist climate, or a warm and moist temperature when conjoined with an impure air; the lymphatic, phlegmatic, and bilious temperaments; a soft, relaxed, and plethoric habit of body; the scrofulous diathesis (HEISTER); the syphilitic taint (PIDERIT and HUFELAND); and advanced age. The infrequency of these maladies in warm and dry climates, as Egypt, Syria, Arabia, and Nubia, has been remarked by several writers.—*b. The exciting causes* are,—1st, External, or physical agents, which occasion chiefly the more idiopathic and active forms of dropsy; and, 2d, Antecedent diseases.—*a. Of the former*, the most influential is cold conjoined with moisture, particularly if acting upon a person in a state of perspiration. The influence of a humid atmosphere may be imputed to the circumstance of its impeding the pulmonary and cutaneous transpirations, and occasioning the accumulation in the vascular system of the watery parts of the blood, or a recementitious plethora, if the kidneys perform not a proportionately increased function; and this effect is promoted if cold be superadded. When a moist air is loaded with miasmata, the injurious effects are still further heightened, as internal congestions and obstructions of the liver and spleen are thereby produced; humidity and cold frequently giving rise to acute, and warm moisture with malaria to passive, dropsies, or those depending chiefly on visceral obstruction. The operation of humidity in causing these diseases was explained by ERASTUS, VAN SWIETEN, and DE HAEN, on the supposition that a portion of the moisture was absorbed from the air into the circulation. Unwholesome food and a poor and watery diet, although justly considered as a cause by BONET, FOTHERGILL, and others, can act only by debilitating the frame, and inducing a state of general cachexy, or disease of some viscus terminating in effusion. VAN HELMONT and PEZOLD conceived that the use of pork is productive of dropsies; and I believe that there is some truth in the opinion. That this diet favours the generation of the scrofulous and gouty diathesis, is certainly a result of my observation. Drinking cold fluids, particularly when the body is perspiring and fatigued, not infrequently causes the active states of these diseases; and all kinds of ingurgitation, especially drunkenness, are perhaps the most common agents, in as far as they seldom fail of producing those visceral lesions on which watery effusion so often depends. Violent fits of passion were considered by LUDOLFF and DE MEZA, indolence by TISSOT, sedentary occupations by RAMAZZINI, and general debility by WAINSWRIGHT, DE HAEN, D. MONRO, and LUDWIG, as occasional sources of dropsies. The influence of anxiety and the depressing mental emotions, in favouring their occurrence, if not in directly exciting them, cannot be doubted. Pregnancy, and abortions; severe injuries, succussions and concussions of the trunk (BONET, DE HAEN, &c.), difficult dentition, may also excite some one of these maladies. The complication of ascites with pregnancy has been observed to every practitioner. The sudden suppression of cutaneous eruptions and accustomed



discharges is one of the most common causes of dropsical effusions, particularly when other concurrent circumstances are present. LENTIN, HAUTESIECK, BACHER, RIEDLIN, THILENIUS, WILlich, SCHMIDTMANN, and FRANK, insist much upon the repulsion of the acute exanthemata and erysipelas; and GMELIN, HUFELAND, and OSIANDER, upon that of the itch, herpes, lepra, and porrigo. I have often seen acute hydrocephalus appear after the use of external remedies in the cure of porrigo, to the neglect of internal measures. MORGAGNI, PISO, GUYON, FISCHER, MICHAËLIS, and others, instance the occurrence of acute dropsies after the suppression of gout and rheumatism; CÆLIUS AURELIANUS, RHODIUS, FORESTUS, and SCHMOEGER, after the disappearance of hæmorrhoids; and MORGAGNI, HOFFMANN, AB HEER, OBERTEUFFER, DEMIANI, BRISBANE, FRANK, and FAUCHIER, after the suppression of the menses and the lochia. The sudden arrest of an habitual diarrhoea and of chronic dysentery has been observed by HIPPOCRATES, RIEDLIN, FRIZE, and STOLL, to produce effusion, particularly in the peritoneal cavity; and general dropsy has been observed by BARTHOLIN, LISTER, DE HAEN, POMARD, and LENTIN, to result from suppression of urine. That aqueous effusion should follow excessive depletions and hæmorrhages, has been doubted by some of those who consider it as a consequence of plethora or increased action: but FORESTUS, BLANKARD, HOFFMANN, HALLER, DE HAEN, D. MONRO, GORDON, HELWIG, and others, have met with such occurrences.

9.  $\beta$ . The diseases upon which dropsy most commonly supervenes, are chiefly fevers, and visceral inflammations and obstructions. Quotidian and quartan intermittents, and bilious remittents, when purgatives have been neglected, or when bark and stimulants have been too freely exhibited, to the neglect of requisite evacuations, are often followed by dropsy. THOMANN states, that he has seen it consequent upon sanguineous evacuations carried too far in these maladies. The occurrence of effusion as a termination of inflammations, particularly of serous membranes, and from diseases of the heart, lungs, liver, and spleen, has been generally admitted in modern times. The frequency and the characters of dropsy after scarlet fever have attracted the notice of most writers on these diseases, particularly of WITHERING, FRANK, PLOUCQUET, and HUFELAND. Its occasional supervention during *phthisis*, bronchitis, chronic catarrh, and whooping-cough, must have been familiar to every physician of experience. An aqueous or aqueo-sanguineous effusion into the serous cavities was a common circumstance in the scurvy which formerly proved so destructive to fleets and armies. The connection of dropsies with chronic and obscure diseases of the kidneys, imperfectly noticed by AËTIUS, AVICENNA, MESUË, LENTIN, and TILING, and fully established by the researches of Dr. BRIGHT, is of the utmost practical importance. The occasional dependence of these maladies upon lesions of the uterus and alterations of the organs already mentioned, as well as upon others, will be more particularly noticed hereafter.

10. iii. APPEARANCES OBSERVED ON DISSECTION.  
— A. In the cavities and parts the seat of the effusion. — (a) The serous membranes are frequently

found thickened and opaque, sometimes softened, and occasionally harder than natural. In many cases, evidence of antecedent inflammatory action, as coagulable lymph, and cellular bands, or the remains of old adhesions, exists in the pleuræ or peritoneum. BONET observed the latter membrane inflamed and covered by a mucus-like matter; DE HAEN and BARRON, granulated or tuberculated; TACHERON and AYRE, thickened, opaque, and white; and STÖRCK and others, indurated, and in parts cartilaginous. Similar changes are detected in the pleuræ. Both membranes are often blanched and thickened when the effusion has been of long duration. The cellular tissue in anasarca is sometimes merely infiltrated, and its areolæ distended by the watery fluid. PORTAL states, that it is frequently thickened, the cells dilated or lacerated, and the intermuscular tissue indurated and almost cartilaginous. When the infiltration and distention become great, the denser structure of the cutis vera is sometimes penetrated, owing to the separation of its fibres (BICHAT); and the epidermis is either raised into blisters,—some of which have been seen unusually large by MORGAGNI,—or lacerated, the fluid partially or nearly altogether escaping through the apertures. Occasionally the cellular tissue is much softened and plastic after the liquid is removed; or it is very white or blanched, its appearance suggesting the idea of maceration.

11. (b) The characters of the *effused fluid* have been remarkably overlooked. They vary extremely, but they generally have some reference to the state of vascular action in the seat of effusion. When this has been considerable, the fluid is more or less whey-like and turbid; or it contains pieces of albuminous matter, or flocculi, or fragments of a filamentous lymph; and the serous surfaces are often slightly covered in parts with a reticulated lymph, or a muco-albuminous substance. In cases where the effusion has been chiefly owing to an altered state of the blood and diminished vital cohesion of the tissues, the accumulated fluid is frequently dark-coloured, turbid, of a dirty or sanguineous appearance. These conditions are principally found in dropsy of the pleuræ, pericardium, and peritoneum. When the disease occurs slowly, and is chiefly owing to debility, original conformation, or impeded circulation, the fluid is usually more limpid; and it is frequently remarkably so, being also nearly devoid of animal matter, as in chronic hydrocephalus and spina bifida. In some instances, and particularly in ascites or ovarian dropsy, the fluid collected after repeated tapping often assumes very diversified appearances. It has been remarked of a yellowish, greenish yellow, or greenish colour; or brownish, or even nearly black, by MORGAGNI, LITRE, and others. It has likewise presented puriform, viscid, gelatinous, milky or chylous characters, according to WILLIS, MORTON, BECKER, COSTE, and PROCHASKA. It has, moreover, been found possessed of a foetid or penetrating odour by some authors now mentioned, and by myself. The milky or chylous fluid is ascribed by several pathologists to rupture of a lymphatic vessel. The puriform and viscid or jelly-like effusion is most probably caused by sub-acute or chronic inflammation. The yellowish or greenish yellow tint is some-



times owing to concomitant jaundice, or disease of the liver occasioning the accumulation of the colouring constituents of bile in the fluids; and the green, brown, or black colour probably arises from the presence of a portion of the colouring matter of the blood. The offensive odour, as well, perhaps, as some of the above alterations, may be the consequence of the admission of air into the cavity after tapping, and of the super-vention of inflammatory action upon this operation, or of the long retention in a high temperature of a fluid containing a large proportion of animal matter, or of both circumstances conjoined. The liquid effused into the ovaria is generally possessed of very different characters from those presented by the fluid found in the pleuræ or peritoneum; and that of chronic hydrocephalus and spina bifida is commonly different from all others,—the liquid found in the ovarium, and in the brain, presenting, respectively, the opposite extremes of fluidity, or rather of animal matter. As the properties of the fluids are different not only in the several seats of the effusion, but also according to the states of vital action accompanying it, but little importance can be attached to the results of chemical analysis, unless they be derived from an extensive and diversified series of cases. These obtained by Dr. MARCET are not materially different from those furnished by BOSTOCK, BARRUEL, and BERZELIUS, who found that all the specimens of fluid contain nearly the same saline ingredients as the serum of the blood; and that the chief difference consists in the quantity of animal matter, chiefly albumen and incoagulable mucus (the osmazome of BERZELIUS and BARRUEL) they furnish. The following table is given by Dr. MARCET:—

| In 1000 grains of fluid. | Specific gravity. | Total solid conts. | Animal matter. | Saline matter. |
|--------------------------|-------------------|--------------------|----------------|----------------|
|                          |                   | grains.            | grains.        | grains.        |
| Fluid of Spina bifida -  | 1007.0            | 11.4               | 2.2            | 9.2            |
| Hydrocephalus -          | 1006.7            | 9.2                | 1.12           | 8.08           |
| Ascites -                | 1015.0            | 33.5               | 25.1           | 8.4            |
| Ovarian dropsy -         | 1020.2            | —                  | —              | 8.0            |
| Hydrothorax -            | 1012.1            | 26.6               | 18.8           | 7.8            |
| Hydrops pericardii -     | 1014.3            | 33.0               | 25.5           | 7.5            |
| Hydrocele -              | 1024.3            | 80.0               | 71.5           | 8.5            |
| Blister -                | 1024.1            | —                  | —              | 8.1            |
| Serum of Blood -         | 1029.5            | 100.0              | 90.8           | 9.2            |

12. *B. The lesions of the viscera* which are connected with the production of dropsies, include almost every variety of which they are susceptible. The heart, its valves, and membranes; the blood-vessels, particularly the veins and lymphatics; have presented, in different cases and states of the disease, nearly every alteration described in the articles on the morbid anatomy of those parts. To these I must refer; but here may add, that the absorbent vessels have been found varicose and otherwise diseased, and the glands in the vicinity of the blood-vessels indurated and enlarged, by MORGAGNI, MORTON, SOEEMMERRING, HAASE, ASSALINI, BICHAT, MASCAGNI, and HODGSON. The frequency of inflammatory appearances in the inner membrane of the arteries, and the presence of ossific deposits in them and in the aorta, have been remarked by HOFFMANN, FRANCK, BADER, and myself. The respiratory organs, the liver, gall-bladder, and spleen, present, in different cases, all the appearances described in the articles on these viscera. As

respects the liver, it may be observed, that those changes and morbid productions which interrupt the circulation through the ramifications of the vena portæ, as remarked by Dr. BRIGHT; also the nutmeg-like state of its substance, obstruction of the branches of the hepatic duct by inspissated bile and cholesterine, and calculi in the gall-bladder; are the most common lesions.

13. The next important changes are detected in the kidneys. MORGAGNI gives a case from PICCOLHOMINI, in which one of them being lacerated from the presence of calculi, the urine flowed into the abdomen. RIBE (*Swed. Abhandl. b. xiv. p. 47.*) found them scirrhus; and HUFELAND met with numerous hydatids contained in cysts formed in their substance. Instances, however, were few, in which disease of the kidneys was mentioned by authors in connection with dropsy, and, when noticed, it was in a very vague and unsatisfactory manner, until Dr. BRIGHT furnished numerous proofs of the frequency of lesions of structure in these organs, and described their various forms, and relations to dropsical effusions. The *first* form which he particularises, seems to consist of wasting of the structure, and diminished vascularity and firmness, of the kidneys, which are of a yellow mottled appearance externally; their internal structure being also yellow, slightly tinged with gray, and the tubular portions of a lighter colour than natural. They contain no morbid deposit. This change is connected with a cachectic habit of body and debility; the urine being only slightly coagulable. The *second* form is that in which the whole cortical part is converted into a granulated texture, with a morbid interstitial deposit of an opaque white substance; giving, in its earliest stages, when the tunic is taken off, an increase of the natural fine mottled appearance of the organ; subsequently, with innumerable specks strewn over its surface, and distributed throughout its whole cortical substance, and with deficiency of its firmness. At a later period, the granulated texture shows itself externally, occasioning irregular projections of the surface, the organ being generally somewhat enlarged. In the *third* form of disease, the kidney is quite rough and scabrous, and its surface rises in numerous projections, not larger than a pin's head, of a yellow, red, and purplish colour. Its shape is often inclined to the lobulated; it is nearly of a semi-cartilaginous hardness, and it gives great resistance to the knife. The tubular portions are drawn near to the surface, every part of the organ appearing contracted, and less interstitial deposit being present than in the foregoing variety. Dr. BRIGHT connects these two varieties with coagulable urine; and thinks that, as the one appears to pass insensibly into the other, they are commonly grades, or stages of the same change. Besides these, there are other lesions of the kidneys found in dropsies: as preternatural softness; obstruction of the tubular structure, by a white deposit resembling small concretions; scrofulous matter infiltrated or deposited in the cortical substance, and in the interstices between the tubuli; and, indeed, most of the lesions described in the article KIDNEYS. It is very justly remarked by Dr. J. GREGORY, that disease of these organs is chiefly found in those dropsical patients who are of a strumous diathesis, or who are addicted to



spirituous liquors. The uterus and ovaria often present numerous lesions of structure, but none that are especially connected with dropsy, excepting those accumulations of fluid which sometimes take place in the latter organs, and which can scarcely be considered as a species of this disease. Various morbid appearances are also found in the omentum and mesentery, particularly in ASCITIS. (See DROPSY of the Abdomen.)

14. iv. OF THE CHIEF PATHOLOGICAL STATES OCCASIONING DROPSIES.—The lesions, to which dropsical effusion has been imputed in modern times, have been too generally those alterations of structure either preceding or attending it. But, although these are manifestly important agents in its causation, yet they are not the only agents, for we very frequently find them in their most fully developed forms without any effusion. Of the numerous remote and pathological causes enumerated above, there is none, which will singly produce dropsy. And, perhaps, in no other disease is a greater concourse of causes requisite to its appearance, than in this. In recent times, the changes of structure have been investigated, somewhat to the neglect of vital conditions or manifestations; and the former has been too generally looked upon, in respect of the diseases now under consideration, as proximate causes, instead of being viewed as concomitant lesions resulting from anterior changes implicating the functions of life, in one or more of the systems and organs of the frame. The association, however, of these lesions should not be overlooked; and the share which each may have in augmenting or perpetuating the other ought to be kept in view, but with a philosophic reference to anterior conditions.

15. Up to the end of the last century, dropsies were considered as essentially depending upon obstructions or debility; although some among the ancients, particularly HIPPOCRATES, admitted the propriety of bleeding in some cases. STOLL, STRAK, BRAMBILLA, SCHMIDTMANN, J. P. FRANK, and GRAPENGIESSER, at the epoch now alluded to, inculcated the frequent inflammatory origin of these diseases. WELLS, BLACKALL, ABERCROMBIE, STOKER, and AYRE followed in the same track; and, excepting a slight disposition to carry this doctrine too far, contributed to the advancement of this branch of medical knowledge. At present it is generally admitted that dropsy may arise from sur-action, or sub-action,—from general or local plethora, as well as from obstructed circulation,—from deficient excretion, and from excessive evacuations rendering the blood thin or watery. The numerous changes detected in connection with aqueous effusion, and allowed to favour both it and the accumulation of the fluid, may be resolved into a single proposition, viz. increased exhalation and diminished absorption, which comprises all the views promulgated on the subject, the matter chiefly in dispute being as to which of these changes is the accumulation of fluid chiefly owing. It has been attempted to settle the point by experiment and *post mortem* research. But a matter purely of function—lesions so dependent on vital action and structural cohesion as effusion most undoubtedly is in many cases, however associated, or otherwise dependent upon organic change—cannot admit of a satisfactory elucidation in this manner alone.

16. Those who favour the doctrine of increased exhalation argue, that this change usually follows excited action, or irritation of serous surfaces, or relaxation of the exhaling pores, or this latter state associated with increased action of the larger vessels; that the appearances of the fluid and the constitutional symptoms indicate the existence of excited action; and that absorption is not diminished, is shown by the increasing emaciation attending the effusion, and by the fact of this function being generally augmented with the progress of debility. The believers in diminished absorption contend that, when the agents of this function—either lymphatics or veins—are obstructed, an accumulation of serum takes place in the parts beyond the obstruction; that when plethora, general or local, exists, absorption is diminished, as shown by the experiments of MACGENDIE and FODÉRA; and that, as vascular fulness and action are removed, this function becomes restored to its natural activity. That the balance of function—of exhalation and absorption—is broken, is very obvious; but the question is, to which is the fault chiefly attributable? It is evident that exhalation preponderates over absorption, in all cases where vital action or vascular plethora is increased; and that, on the other hand, diminished absorption chiefly obtains where the venous or lymphatic circulation is either impeded or obstructed. These propositions are proved by experiment, and confirmed by repeated observation and numerous pathological facts. So that, instead of contending as to which of these functions is chiefly disordered, it would have been more correct to admit that either may be more or less affected in different cases and forms of the disease, according to the states of vital energy and the nature of concomitant organic change. Conformably, therefore, with these facts, rejecting all exclusive doctrines, and following nature as closely as I am enabled to interpret her actions, I believe that dropsy may arise as now stated, as more precisely expressed in the article DISEASE (§ 94.), and as will be more particularly described in connection with lesions of vital manifestation and of structure.

17. In considering the pathological states occasioning dropsy, the *conditions of vital action* appear equally important with *structural change*, the more especially as the effusion, even where the latter is the most obvious, depends as much upon the former as upon it; alterations of vital manifestation giving rise to both the change of structure and the effusion, whether or not the effusion be a concomitant or a consecutive result. This consideration has so forcibly influenced the ablest writers, as to induce them to arrange the forms of this disease with strict reference to it. Thus they have been divided into the *acute* and *chronic*, the *sthenic* and *asthenic*, the *tonic* and *atonic*, the *active* and *passive*, the *inflammatory* and *non-inflammatory* or *leucophlegmatic*, and into the *idiopathic* and *symptomatic*, or the *primary* or *secondary*—as they proceed directly from their external causes, or from some visceral disease. These forms are met with in all the seats of dropsy, but in different degrees of frequency. The acute, sthenic, or active state—the effusion consequent upon increased determination and excited action—occurs most frequently in the ovaria and brain, and next in the



pleuræ, pericardium, cellular tissue, and peritoneum. Although these states are nearly allied to, they are not identical with, the inflammatory variety of dropsy, which is also most common in the former of these situations. Idiopathic or primary dropsy very generally assumes these states, being connected either with plethora, with increased determination, or with inflammatory action, the augmented exhalations supervening to, and promoting the resolution of, its acute or early stages. This connection will, therefore, be kept in view in the following remarks.

18. *A. Primary or Idiopathic Dropsy.*—(a) *Acute dropsy, or effusion from increased action* (the *Sthenic, Tonic, Acute, Active, and Inflammatory*, of authors; the *Augmented Secretion of Irritation* of DUPUYTREN and BRESCHET; the *Hydrophlegmasiæ* of M. RAYER; a form of *Hypercrinia* or augmented secretion, by M. ANDRAL). TISSOT, GEROMINI, and BOVILLAUD consider this form of disease to be intermediate between healthy exhalation and inflammatory action; and Dr. PARRY, that it is the result of increased momentum or determination of the circulating fluid to the seat of effusion. That it often originates in vascular excitement of the part chiefly affected, and is frequently connected with general, relative, or excrementitious plethora, have been fully demonstrated. But the vascular excitement, and especially the injection of the capillaries usually accompanying it, is often dissipated, either partially or altogether, soon after the effusion it occasions has become considerable; and but little remains of the vascular action, which may have approached the inflammatory state at the commencement, or of its usual results, but the unabsorbed fluid.—As soon as the vital tonicity of the exhaling vessels or pores become even partially exhausted, or the vital cohesion of the serous or cellular tissues diminished, even the natural momentum of the circulation in the larger vessels will be sufficient to produce or keep up a morbid increase of the exhalation.

19. *a.* The *exciting causes* of acute dropsy are suppression of the perspiration and of any of the natural secretions and discharges, repulsion of the exanthemata and acute eruptions, and the usual causes of inflammatory diseases. It is often consequent upon scarlatina, and the puerperal states; or connected with inflammations, particularly of the viscera invested by serous membranes; and with sub-acute inflammation or active congestion of the central parts of the brain, the substance of the lungs, the pleuræ, the pericardium, the uterus, and the ovaria. It occurs most frequently in the young and comparatively robust; and is either an *idiopathic disease*, as I have here chiefly considered it, or a *termination* of a morbid state nearly allied to inflammation, or a *consecutive or symptomatic* malady, as when it is preceded or attended by lesions of some adjoining or remote viscus, in which form it will be considered in the sequel.

20. *β. Progress.*—Although acute dropsy generally appears suddenly and increases rapidly, yet various symptoms of disorder precede those dependent upon the effusion. The preliminary disturbance is often indefinite; but a sense of uneasiness, soreness, or slight pains of the parts in the vicinity of, or inclosed by, the cavity about to be the seat of the effusion, with disturbance of their functions; more or less derangement of the natural

secretions and excretions; increased hardness, or fulness, or frequency of pulse; irregular chilliness or febrile phenomena, and a feeling of general indisposition; often precede, in various grades of severity, and for a longer or shorter time, the pathognomonic symptoms of effusion. When these first appear, the pulse is usually hard, full, and accelerated, and the skin hot and dry. There are also restlessness, pains in the back and limbs; tenderness of the surface of the body, particularly over the chief seat of disease; loaded or white tongue, thirst; constipated bowels; scanty, thick, high-coloured urine; and, if the effusion takes place in the thorax, dyspnœa, cough, and other symptoms of that form of the disease, generally precede rather than accompany it. The febrile symptoms often partially subside in a few days as the effusion increases, whilst the symptoms caused by the accumulation become more and more urgent. The urine, in this form of dropsy generally furnishes, by heat and acids, more or less of a coagulated albumen,—a fact first insisted upon by Dr. WELLS and Dr. BLACKALL, and imputed by Dr. BRIGHT to disease of the kidneys. There is no doubt of this being a frequent phenomenon, both in acute dropsy, where there is no evident lesion of these organs, and in other forms of the disease, where they are extensively altered. I have, however, occasionally observed it where there was neither dropsy, nor any disorder of these emunctories; but it is probably more frequently connected with these disorders, than otherwise.

21. (b) *Sub-acute dropsy.*—The preceding may be viewed as the most acute or inflammatory form. Yet there are states of the disease intermediate between it and that next to be noticed.—*α.* Those which approach the nearest to the *sthenic* or *acute* arise from similar causes, are often preceded by the same indefinite symptoms, and manifest themselves more or less suddenly, but advance less rapidly, than it. Sub-acute dropsy most commonly occurs in the cavities of the chest and pericardium, or in the cellular substance; and is not infrequently complicated with bronchitis, or with inflammation and hepatisation of the lungs. It sometimes follows scarlet fever, or even measles. I met with two cases of it after severe attacks of the influenza of 1833.—*β.* Those states of it which approach the *asthenic* or *passive* form (§ 22.) are most frequently seated in the peritoneal cavity, or in the cellular tissue, or in both; are sometimes connected with the puerperal states, or chronic bronchitis; and are seldom preceded or attended by any fever, increase of temperature, or tenderness of surface: but all the secretions and excretions are more or less impeded, and some of them are entirely interrupted. The urine is only occasionally, or slightly, coagulable, and chiefly in those cases which approach closest to the acute.—*γ.* The sub-acute form of dropsy, especially, may arise from whatever will determine or solicit a greater flow of blood than natural to serous surfaces; particularly if the tonicity of the exhaling pores, and vital cohesion of the tissue, are insufficient to oppose the momentum of the circulation.

22. (c.) *Asthenic or passive dropsy* is much more rarely a primary or idiopathic disease than symptomatic of, or dependent upon, the pathological states about to be described. In its primary form, it may be attributed chiefly to relaxation of



the exhaling pores, and of the serous and cellular tissues, and to increased tenuity, or alterations of the blood existing independently of any considerable structural change. It is sometimes *caused* by excessive sanguineous evacuations, or exhausting discharges; by the suppression of secretions; and by a deficient, watery, vegetable, or unwholesome diet. The dropsy that sometimes prevails among the poor in times of scarcity is generally of this kind. It is usually *characterised* by a weak, unequal, small, and frequent pulse; paleness of the lips, tongue, and gums; flaccidity of the muscles; anhelation on slight exertion; feebleness of the joints; swellings of the lower limbs, or anasarca attending or preceding the effusion into the cavities of the trunk; an unhealthy appearance of the cutaneous surface; and absence of those symptoms which indicate the existence of visceral obstruction or disorganisation. The urine does not coagulate by heat or acids. This form of dropsy is usually chronic, and is, in adults, most commonly seated in the abdomen, or in the cellular tissue, or in both; sometimes appearing in these situations, particularly the former, after parturition, when it may assume a less asthenic form than that now described. It occurs most frequently in females, and is occasionally associated with hysteria. I have seen it supervene on chlorosis. In infants it usually takes place in the head, and proceeds from constitutional disposition or congenital vice.

23. *B. Secondary or Consecutive Dropsies—Symptomatic Dropsies—Chronic or Passive Dropsies*—are of most frequent occurrence. They are sometimes preceded by inflammatory action; are seldom, however, attended by acute, but often by sub-acute or chronic inflammation, or by active congestion. They are usually of long duration, and frequently the effects of complicated organic change, although generally more immediately dependent upon some specific lesion.

24. (a) *Dropsy from disease of the heart* is always preceded, for a long or indefinite period, by symptoms of disease of this organ. When effusion commences, early evidence of it is presented in the countenance, particularly in the morning, in the eyelids; and next in the feet and ankles, in the evening; or in the hands and forearm, particularly the left. These partial anasarca swellings usually continue a considerable time before signs of the accumulation of water in the chest are manifested, and still longer before any effusion takes place in the abdomen. In some cases, indeed, no fluid is found in this latter situation. The pulse is frequently, but not always, much affected long before any anasarca is observed. When water collects in the face, hands, or arms, after protracted ill-health, and without pulmonary symptoms, disease of the heart may be inferred, notwithstanding the regularity of the pulse: but auscultation will detect its nature. Generally, as the effusion increases in these parts, so symptoms of its commencement in the chest or pericardium, most frequently in both, make their appearance. The patient at first requires his head and shoulders more elevated than usual in bed; and at last he cannot lie down, the effusion increasing in the cellular tissue, and extending to several or to all the shut cavities. In some cases, particularly when the disease of the heart

is of an active nature, hæmoptysis, pneumonia, or pleuro-pneumonia, or congestion, takes place in the lungs in the course of the dropsy, and favours or increases the thoracic effusion. When the cardiac disease consists chiefly of passive dilatation and thinning of the cavities, the effusion is usually also of a passive kind, or attended by vascular and general asthenia, a lowering treatment accelerating a fatal issue. Occasionally the anasarca disappears, or is diminished, for some time before death; but the symptoms of the internal accumulation of fluid become more urgent. When obstruction in the valves of the left side of the heart exists, congestion of the lungs, with sudden increase of the effusion into the pleura, not unfrequently occurs, and terminates life by asphyxy. The *urine*, in this state of the disease, is often without any albuminous coagulum, or with very little: but it may, or may not, exist even in the same case, at different stages of its course. This form of dropsy is very frequently benefited by treatment, or for a time apparently removed; but it as often recurs, until the progress of the primary lesion, and the exhausted vital energies, at last favour an increased, a more general, or more sudden effusion, often associated with pulmonary congestion, and life is thereby quickly terminated. When the excreting functions are impeded, the effused fluids may, from effete or irritating matters being secreted along with them, act injuriously upon the surface or tissue with which they are in contact; and, in this manner, much of the appearance of irritation or of structural change, observed either in its course or after death, may be superinduced.

25. (b) *Disease of the blood-vessels and lymphatics* is often productive of dropsies; but in many instances its seat and nature cannot be determined during the life of the patient, and frequently with difficulty afterwards.—*a.* The actions of the *arteries* and *capillaries* are more or less affected—are obviously increased in acute, and diminished in passive, dropsies;—but the change is one of function rather than of structure. There are, however, few cases of the chronic or passive forms of the disease met with in advanced age, where the arterial system is entirely devoid of structural lesion. But when we consider the frequency of alterations in this system in old age, it becomes a question whether it be connected with effusion, otherwise than as both may be coincident results of anterior disorders. Some French pathologists, however, believe that the simple retardation of the circulation, occasioned by structural change in the arteries, favours effusion into the cellular tissue and serous cavities.

26. *β.* In respect of disease of the *veins*, it may be inferred *à priori*, and pathological facts have confirmed the inference, that obstructions of them will occasion dropsical effusions, unless a collateral circulation be established sufficient to prevent extreme congestion of the vessels below the part where the impediment exists. This position, acknowledged since its demonstration by LOWER, has been frequently illustrated by the details of cases. RAIKEM found, in two instances, anasarca of the lower limbs, fibrinous concretions obstructing the vena cava and internal iliac veins. MORGAGNI observed a similar state of the extremities from a tumour which pressed upon these vessels; and attributes, in some cases,



dropsy within the head to pressure upon the superior vena cava. HALLER states, that compression of the jugular veins has produced dropsy of the ventricles and membranes of the brain. LAENNEC found obliteration of the vena cava in a case of ascites and anasarca. I have seen, in two cases, enormous distention of the thigh and leg, from the pressure of a psoas abscess upon the iliac vein; and analogous facts are recorded by HODGSON, D. DAVIS, BOUILLAUD, VELPEAU, MECKEL, and LEE. Organic change about the right side of the heart, or tumours pressing upon the thoracic portion of the vena cava, will obviously produce a similar, but more general effect. And I believe, with several pathologists, that congestion or engorgement of the large veins, from deficient vital power, particularly if it continue for any time, will, independently of mechanical obstruction, be sufficient to occasion both increased effusion and accumulation of fluid, owing — 1st, to impeded circulation, consequent dilatation of the smaller vessels, and escape through the pores of a part of their more fluid contents; and, 2d, to diminished absorption, which M. MAJENDIE has shown by experiment to exist in parts whose blood-vessels are inordinately congested. If we allow, with this physiologist, and with several others, who have furnished evidence in recent times, that the veins exert an absorbing function, either directly by their radicles, or by lymphatic vessels opening into them, we must necessarily admit that any obstruction, vital or structural, of the venous circulation, will be followed by an accumulation of fluid in parts beyond the seat of obstruction.

27.  $\gamma$ . Diseases of the *lymphatics*, both functional and organic, have been viewed, as stated above, as causes of dropsies. It is obvious that little beyond the evidence of analogy can be advanced in favour of impaired function of these vessels: but when we consider that many of them open into veins, without passing through glands, we may admit that they will experience the same modifications of function as those vessels with which they are thus intimately connected. And when we reflect on the various circumstances calculated to retard or to entirely obstruct the circulation in the lymphatics passing through glands, and conveying their fluids into their principal trunks, the admission of impaired function, in some cases, cannot be unreasonable. Of this species of lesion, it is obvious that *post mortem* research can furnish no positive proof: but of structural change direct evidence may be advanced, although the difficulty of obtaining it, even in cases where it may exist, will necessarily diminish the amount. It has been considered by several of the authors mentioned above (§ 26.), that rupture of the lymphatics; by MORGAGNI, ASSALINI, BICHAT, SOEMMERRING, &c. that a varicose state of these vessels; by SCHERB and SAVIARD, that concretions formed in their principal trunks; by HAASE, BOYER, HUNTER, CRUICKSHANKS, SOEMMERRING, MASCAGNI, &c. that compression of either them or their glands; by most of the authorities now named, that obstruction, destruction, or extirpation of these glands; and, lastly, by some of them, that inflammation of the lymphatics, may severally be followed by dropsical accumulations. On the other hand, cases have been adduced by MORTON, D. MONRO, CULLEN, A. COOPER, BICHAT, and LAENNEC, in

which the principal lymphatic trunks were obstructed without any collections of fluid having been formed.—D. MONRO and M. DUPUYTREN tied the thoracic duct in the lower animals, but dropsy was not the consequence; whilst Mr. CHESTON found it obliterated in a case of anasarca. I therefore infer, that alterations of these vessels either may, or may not, be the principal pathological cause of the accumulation of fluid; that, in respect of these species of lesions, as well as of others, additional changes are frequently requisite to the production of effusion; and that, in many instances where disease of these vessels has been found in connection with dropsy, it has been rather a coincident effect of functional or structural change, or of both, in some vital organ, than the chief source of the collection of fluid. From what has now been stated, it may be concluded, that opinions as to the exclusive operation of any one set of vessels in producing symptomatic dropsies are altogether erroneous, and that either of them may be concerned in the result, more especially the veins.

28. The *fluid* collected in dropsy from obstruction in the circulation differs from the serum of the blood chiefly in containing much less albumen. It is usually limpid, inodorous, either colourless or of a citron tint; and, in some instances, when the obstruction has occurred suddenly, it is slightly coloured by the escape of a few of the colouring particles of the blood. The parts containing it are commonly free from any material change, excepting in the more chronic cases; and it often collects in very considerable quantity, before much disorder referrible to the accumulation is complained of. The symptoms will necessarily vary with the seat and rapidity of the collection, and the parts primarily or consecutively affected. The *diagnosis* of effusions depending upon disease of the circulating vessels is very difficult in all cases, and nearly impossible in many. When it occurs in the strumous diathesis, or early in life, or is connected with, or consequent upon, swellings of the lymphatic glands, lesions of the lymphatic system may reasonably be inferred; and when it commences as a local œdema, or is limited to a single limb, or continues in the lower extremities without any signs of disorder referrible to the large cavities, the obstruction of a considerable venous trunk may be inferred. If it appear very slowly in the lower extremities, and increase very gradually, and be attended by a slow, or unequal, or irregular pulse, great coldness of the limbs, with or without discolouration or sores of the legs, particularly in aged or gouty persons, the arterial system will very generally present structural change, as ossific deposits in some part of its course.

29. (c) *Dropsy connected with disease of the lungs*. — Either hydrothorax or anasarca, or both, may occur in consequence of pulmonary affection, or merely as coincident effects of the same causes; and in many instances effusion may take place in the pericardium, in addition to the other forms of dropsy. The acute states of anasarca are not infrequently connected with inflammation, congestion, or hepatisation of the substance of the lungs, or with acute bronchitis, particularly after exposure to cold and moisture, or after scarlatina or measles. In many of these cases the pulmonary affection is somewhat obscure, the symptoms



being imperfectly developed; and, unless auscultation be used, is liable to be overlooked or mistaken. Dropsy from chronic bronchitis generally supervenes and proceeds much more slowly than that which is connected with the acute diseases now mentioned, but it usually appears in the same manner; the face, particularly the eyes, and upper extremities, first becoming oedematous, and subsequently the ancles. When any aggravation of the bronchial affection occurs, or if the inflammation extends to the substance of the lungs, the dropsical effusion often increases rapidly. After repeated exasperations of the pulmonary disease, with occasional amelioration during summer, in the more prolonged cases, the anasarca becomes more and more general, and at last effusion takes place into the pleuræ, the pericardium, the cellular substance of the lungs; less frequently into the peritoneum; and in some instances into the ventricles, or between the membranes of the brain; and the patient is more or less suddenly cut off.

30. As fluid is effused into the pleuræ, or cellular parenchyma of the lungs, difficulty of lying down, and dyspnœa, come on and increase; and as it collects in the pericardium, irregularity of the pulse, palpitations, anxiety, oedema of the countenance, fulness of the jugular veins, &c. supervene. If it accumulate on the brain, stupor, coma, paralysis, or apoplexy, takes place. Dropsy occurring in the latter stages of tubercular consumption or chronic pleurisy is generally confined to the lower extremities. It sometimes, however, extends more generally, and occasionally more or less fluid is effused into the cavities of the chest.

31. (*d*) *Dropsy from disease of the liver and spleen.*—The ancients imputed dropsy more to the liver than to any other part; and during the fifteenth and sixteenth centuries, this organ was generally considered as being always its cause. WARBOLD, PEZOLD, VATER, BIANCHI, and others, however, showed that it was sometimes free from alteration, even in ascites; and more recent and precise research has proved that it is often not materially changed; and that, in many cases of dropsy, where it has presented certain alterations, disease was likewise found in other viscera, to which the effusion might be referred with greater justice than to the hepatic lesion. But collections of fluid are very frequently formed in the last stages of most chronic diseases of the liver, especially in those which impede or obstruct the circulation of the vena porta. As to the nature of the lesion, very imperfect, or hardly any, knowledge can be obtained during life, or even previously to the effusion, unless as to the existence of enlargement, and sometimes of abscess, which may generally be ascertained by careful examination and percussion.

32. When, however, the dropsy has been preceded, for a long period, by dyspeptic symptoms, particularly by flatulence, uneasiness in the stomach after a meal; by pain or tenderness in the right hypochondrium, below the right shoulder-blade, or at the top of the shoulder; by short, dry cough, and the usual signs of chronic disease of the liver, more particularly by the projection of the edge of the organ below the cartilages of the false ribs; by jaundice; light or clay-coloured stools; scanty red or high-coloured urine, depositing the lithic acid sediment; and by slight evening fever; the accumulation may be imputed

to the liver, the disease of which, and its attendant symptoms, being frequently of very long duration before any collection forms. The dropsy usually appears first in the ancles, towards night; or in the abdomen, occasioning slight fulness; or nearly at the same time in both. The urine is then more scanty; and sometimes becomes dark, muddy, turbid, or thick. The skin is often harsh or dry, the bowels constipated, and thirst increased. The progress of the accumulation varies considerably. Occasionally the anasarca of the lower extremities and the ascites increase equally and gradually. In some instances, the former proceeds much more slowly than the latter; and, in others, the ascites arrives at its utmost extent without much oedema of even the ancles. In many cases there is great vacillation in the course of each; the one increasing and the other diminishing, or either or both experiencing a sudden aggravation, and rapidly reaching the acmé. Sometimes, the collection in the abdomen advances rapidly, and arrives at the utmost in a very few days, without any attendant anasarca; the bowels being obstinately constipated, and the urine nearly suppressed. In these cases, the patient generally complains of much pain and soreness, and frequently of tenderness, of the abdominal parietes—probably owing partly to the rapid distention; and possibly, also, to the action on the peritoneum, of the irritating properties of the collected fluid, arising out of the circumstance of its containing much of the injurious constituents that are usually removed from the system in the excretions which are so completely suppressed. In dropsy from diseased liver, there is seldom any effusion into the serous cavities of the chest or head. But as ascites reaches the utmost, dyspnœa becomes urgent, owing to the diaphragm being carried high up into the thorax; and, during the last few days of existence, slight or low delirium appears, at first during the night; the pulse and breathing becoming rapid and weak, and the general weakness extreme, sometimes with distressing nausea or retchings, and the patient sinks.

33. When dropsy depends upon disease of the spleen, evident enlargement of it generally precedes the accumulation of water, which, as when it arises from disease of the liver, usually forms in the abdomen, and in the lower extremities. In some cases, particularly in those who have resided in warm countries, or in miasmatic localities in temperate countries, the enlargement of the spleen is associated with chronic alterations of the liver; and the consequent dropsy is but little under the control of medicine. But when the lesion of the spleen is its chief or only source, it may be removed by treatment, along with the disease in which it originated. When dropsy comes on after repeated attacks of ague, and residence in an insalubrious climate, enlargement of the spleen is often influential in its production, or co-operates with other lesions in causing it. In these cases, change of air is one of the best means of removing it.

34. (*e*) *Dropsy from disease of the kidneys.*—It may be stated of lesions of these organs, as well as of others found in dropsies, that they are often the principal pathological causes of the effusion, but that they frequently also exist without this effect resulting from them. There can be



no doubt that every change of structure, to which the kidneys are liable, may be more or less concerned in the production of effusion, especially those which impede or interrupt their functions. Of this latter kind seem to be the principal of those so well described by Dr. BRIGHT (§ 13.). Dropsy may arise either from disease of the kidneys alone—which but rarely occurs, and in which case it usually commences with anasarca, at first affecting chiefly the lower extremities—or from lesions of these organs associated with those of the heart, or of the lungs, or liver. In such complicated cases, the disease of the kidneys may be either *primary* or *consecutive*; perhaps, more frequently, the latter.—*a.* When it is *consecutive*, the dropsy commences, as already described, in alterations of either the circulating or respiratory systems; the accession of the affection of the kidneys being often distinctly indicated by pains in the loins, sickness, vomiting, occasionally purging, and coagulable urine. In some instances, however, renal disease may exist without these symptoms being prominent; and coagulable urine may be present without the kidneys being particularly implicated.—*β.* When the renal affection is the *primary* alteration, the dropsy commences as anasarca; but rapidly extends to the cavities of the pleuræ and pericardium, of the peritoneum, and not infrequently of the arachnoid. In most of these cases, the symptoms are more acute, and the progress of the disease more rapid, than in any of the other forms of symptomatic dropsy. This seems attributable to the disease of the kidneys being such as prevents them from removing all, or even a large proportion, of the injurious elements constantly requiring elimination from the blood; to the consequent secretion of a portion of them in the accumulated fluid; and to their imparting irritating properties to it; whereby it induces inflammatory action in the serous surfaces containing it, with rapid aggravation of all the phenomena, and occasionally a concentration of the malady in one or more of its usual seats. Thus, it is not uncommon to perceive symptoms of pleuritis or pericarditis, or even of peritonitis, to accompany, or even to precede, the more advanced periods of the effusion into the respective cavities; and, as the disease is increased in one or more of these, to observe the disappearance of the fluid from the extremities. In some instances, where the collection has formed rapidly in the cavities of the chest, either preceded or attended by acute symptoms referable to this situation and its contained organs, not only the anasarca, but also the ascites, where one or both have previously existed, has partially or nearly altogether disappeared, the rapid effusion into these situations soon terminating existence. In other instances of this form of dropsy, effusion on the brain is superadded to these, and the patient dies comatose. Dr. BRIGHT and Dr. GREGORY remark, that there is great proneness to salivation from small doses of mercury in dropsy from diseased kidneys.

35. (*f*) *Dropsy from disease of the uterus and ovaria* may arise either from the pressure they produce, when enlarged, or containing tumours, on the veins and lymphatic glands and vessels; or from the extension of disease from them to their peritoneal covering. I met with a case, in which ascites was consequent upon chronic inflamma-

tion of the uterus, the peritoneum covering the fundus having become consecutively affected; and a nearly similar instance, in which the effusion into the peritoneum was owing to the suppression of leucorrhœa by astringent injections. In this latter case, I inferred that the discharge proceeded from inflammatory irritation of the internal surface of the womb, or of the os uteri, and that the treatment had suppressed the morbid action in these situations, and determined it to the fundus and peritoneal surface; whence it had extended further, and produced effusion into the abdominal cavity. But little anasarca was present in these cases, and that was confined chiefly to the feet and ankles. Ascites may probably likewise follow chronic inflammation of the ovaria, owing to a similar extension of the irritative vascular action to the peritoneum. Excessive hæmorrhage from the uterus, and abortions, may also produce dropsy, as stated above (§ 8.). Those diseases which have been generally described as ovarian and uterine dropsies, are purposely excluded from the present view of the subject.

36. *Of the Urine in Dropsies.*—Owing to the attention that has been paid to this topic in modern times, and particularly since the investigations of WELLS, BLACKALL, PROUT, and BRIGHT, the state of this secretion has become an important source of information as to the pathological conditions giving rise to dropsical collections; although, when viewed alone, much less dependence can be placed upon it. Dr. WELLS found that the urine was more or less coagulable in the dropsies consequent upon scarlatina, and even from the exhibition of mercury; and that this symptom was most frequent in anasarca, it having been remarked in twenty-four cases out of thirty-seven. Dr. CHRISTISON and Dr. I. GREGORY also remarked it most commonly in this form of dropsy; and my experience accords with theirs. I have seldom seen it in ascites. Dr. BLACKALL considered it as an attendant upon the acute form of the malady; and Dr. PROUT, as an indication of irritation. Dr. BRIGHT's cases prove its connection with the more advanced states of the changes of the kidneys he has described, independently of the existence of acute or sthenic vascular action. Several physicians have remarked this state of the urine in other diseases, unconnected with lesions of the kidneys; but admit its frequency in such circumstances, as well as in acute dropsies. I have often observed it in acute diseases of children, where no alteration of the kidneys existed; and I believe it is not uncommon after the exanthemata. The above writers have also noticed a less specific gravity of albuminous than of healthy urine. As to the dark brown colour which this urine frequently presents in dropsy, the inference of Dr. BRIGHT, that it arises from the red globules of the blood, seems to be correct. The presence of albumen may be ascertained either by boiling, or by the nitric or muriatic acids, alcohol, the ferro-prussiate of potash, or corrosive sublimate. The last re-agent is, upon the whole, the best. The opinion of Dr. PROUT, as to the value of albuminous urine as a symptom, will be adopted with advantage; namely, that we ought always to be aware of its presence, as, taken along with the others, it may be



occasionally useful in directing our judgment of the nature of the disease; but that, in the present state of our knowledge, it does not indicate any particular remedy or mode of treatment.

37. v. PROGNOSIS.—The prognosis in dropsies will necessarily depend on their form and origin; on the extent and complication of the structural changes occasioning them, the state of vital manifestations, and the habits and age of the patient. —(a) *Acute* and *sub-acute* dropsies are generally much less dangerous than the symptomatic, particularly when occurring in young persons and in tolerably sound constitutions; but concomitant circumstances, more especially their association with pulmonary disease, and the nature and extent of that disease, will greatly modify the opinion to be formed of the immediate or ultimate result. The form of dropsy which occurs after scarlatina or measles is much more curable than any other. *Asthenic* dropsy, from excessive evacuations or hæmorrhages unconnected with structural change, or that from insufficient or unwholesome diet, generally admits of cure.

38. (b) *Consecutive* or symptomatic dropsies seldom are permanently removed. Those arising from organic change of the heart may be remedied for a time, but they generally recur again and again; judicious treatment frequently prolonging life, nevertheless, for several years. When the effusion proceeds from disease of the lungs, the prognosis will be formed with strict reference to it; and, on the whole, will be less favourable than in the foregoing. The same remark applies to dropsy from changes in the vessels. Accumulations of fluid from organic lesions of the liver are but little under the control of medicine, and generally terminate fatally sooner or later. Occasionally, however, exceptions occur; and much relief is often obtained for a considerable time. When the malady depends chiefly on enlargement of the spleen, a more favourable result has frequently been obtained. Dropsy from disease of the uterus and ovaria seldom terminates favourably. And it would appear that effusions from structural lesions of the kidneys are the most rapidly and certainly fatal.

39. II. TREATMENT.—It will be obvious to every experienced practitioner, that the distinctions made above are merely the more prominent features by which the malady may be recognised, where the acquaintance with it is imperfect; but that there are numerous other shades of character which deserve to be known, and by which he will be in some measure guided in practice, that scarcely admit of description. Of this kind more especially are those ever varying states of vital power, and grades of vascular action, which demand certain indications of cure, or different modifications of treatment, as imperatively as any well-ascertained alterations of structure. There are, perhaps, few diseases that require in the treatment a stricter reference to the conditions of vital power, in connection with changes of its organic alliances, than those now being considered. To ascertain these conditions, and to act strictly in accordance with them in dropsies, even as respects those slighter modifications that can neither be illustrated by examples, nor be made subjects of precept, will tend more to successful practice, than any other object of investigation.

40. i. OF PRIMARY OR IDIOPATHIC DROPSIES.

—A. *Treatment of the Acute.*—The first object of investigation will be the state of the disease in relation to its remote and proximate causes, and of the constitutional powers of the patient, comprising every appreciable change in the vital functions, and in the appearance of the soft solids, as indicating modifications not merely in the grade, but also in the kind, of action. By the inferences derived from this source, the practitioner will be guided in the appropriation of the means of cure, and in the alterations he may conceive necessary of the measures about to be described.—In this form of the disease, especially if it be associated with congestion or inflammation of the lungs, if the constitutional powers be unbroken, and if it have appeared suddenly or advanced rapidly, a full *bloodletting* will be requisite, and may even be repeated. In most cases, however, local bleeding by cupping will be preferable to a repetition of the venæsection; and in more doubtful cases, the local depletion, if decidedly employed, will be sufficient. If cupping be prescribed, it should be performed on the part opposite to the seat of soreness or pain, or at a distance from it, particularly when the lungs or pleuræ are affected. Contemporaneously nearly with depletion, medicine should be taken to act upon the secretions, and equalise the circulation; and, for this purpose, there is, perhaps, nothing superior, in the first instance, to *calomel*, in a full dose, combined with *James's powder*, or with a moderate dose of *camphor*, or with both. In some cases, and particularly in persons who have been addicted to drinking, the calomel will be advantageously conjoined with *opium*. In this class of subjects, general bloodletting must be employed with caution. After one or two doses of calomel, in either of these states of combination, a *purgative* draught should be exhibited and repeated, and its operation promoted by a *terebinthinate enema* (F. 149, 151.). Having removed plethora and reduced the increased action, the good effects of *counter-irritation* will be more readily obtained. The tartarised antimonial ointment (F. 749.), or the pea issue, are upon the whole to be preferred; but they should be employed on the side opposite to that where uneasiness is complained of, or at some distance from the most affected part. Whatever external irritant may be adopted, should be long persisted in. In the course of treatment, calomel or blue pill, with either James's powder or *tartarised antimony*, should be repeated from time to time, until increased action disappear; or be regularly continued, particularly if the pleuræ or pericardium be affected, until the specific mercurial effects become manifest; when deobstruent and *saline purgatives* may be prescribed, and their effects promoted by the occasional exhibition of the enema already recommended. The more cooling *diuretics* only should be given at short intervals, in order to promote the functions of the kidneys. These will be advantageously associated with *diaphoretics*. For the former purpose, the supertartrate of potash with borax, the acetate of potash, and the nitrate of potash alone, or with nitric æther, may be used; and for the latter, the camphor julap with liq. ammoniæ acetatis, with vinum antimonii tartarizati, or acetum colchici, and small doses of opium. In this form of dropsy, I believe that all heating diuretics, as squills, juniper, seneka root, horseradish, with their com-



binations and preparations, are more or less injurious, unless vascular action has lapsed into a state different from the sthenic form with which it commenced. With this impression, I have usually preferred those that are the most sedative and refrigerating, especially foxglove, colchicum, the wine of tobacco in small doses, and the spiritus ætheris nitrici, as long as any evidence of increased action remains.

41. *B. Of Sub-acute Dropsy.*—Those intermediate states of the disease, between the acute and the passive—between the sthenic and asthenic forms—will necessarily require means appropriate to the grade of action they may evince. In the more acute cases, local depletions, and the rest of the treatment described above, will be most efficacious. In these, the judicious exhibition of derivatives and purgatives, followed by diaphoretics and diuretics, constitute the chief means of cure; and, when this state of the disease occurs after scarlatina or measles, or in connection with bronchitis, digitalis, the preparations of antimony with opium, and the warm or tepid bath, in addition to these medicines, and followed by change of air, will prove of essential benefit. In the more sthenic cases of the sub-acute, as well as in the acute, disease, when it arises from suppression of the perspiration, or of the exanthemata, the warm or tepid bath, or medicated baths consisting of emollient decoctions, &c., or containing the sulphuret of potash, or the sub-carbonate of soda or of potash, will be serviceable, when employed after sufficient sanguineous and alvine evacuations. In the less active states of the disease arising from the same causes, particularly from suppressed eruptions, the application, and, occasionally, the repetition, of a large blister, or of mustard poultices, or of warm terebinthinate epithems, at a distance from the seat of effusion, or of irritative action, where the existence of this latter is inferred, will frequently be productive of benefit. In those cases which approach the *passive* or asthenic character, or in such of the above which may lapse into it, owing to neglect of treatment, or to a too active treatment relatively to the nature of the case, or to constitutional fault, the means that will be advised for the form of the disease which is thus characterised (§ 42.) should be employed. It will sometimes occur, especially in the intermediate or more doubtful cases, and even also in the acute, that the more antiphlogistic means will be productive of little or no benefit, or will even appear to aggravate the symptoms, although their exhibition seemed clearly indicated. I have generally observed that the practitioner has been misled by the great frequency of the pulse, which he has mistaken for a sign of increased or sub-acute action, instead of viewing it, when it is at the same time soft, small, and easily compressed, and when it is connected with other signs of depression of vital power, as evidence of great weakness conjoined with increased irritability of the vascular system. In such circumstances, I have found *gentle tonics* and *astringents*, with *deobstruent laxatives*, or with alkaline sub-carbonates; and the moderately stimulating *diuretics*, more especially the *balsamic* and *terebinthinate* preparations, with camphorated *opiates*, &c.; and, if the pulse be languid, with *frictions*, actively, long, or frequently employed; prove very beneficial. Sub-acute or acute dropsies,

appearing after the suppression of the hæmorrhoidal discharge, require, after moderate blood-letting, the active exhibition of *hydragogue purgatives*; and the same states of disease connected with suppressed menstruation are most benefited by a nearly similar treatment, with the addition of the *sub-borate of soda*, continued regularly for some time. In some cases of the less sthenic state of sub-acute dropsy, the internal and external use of the *nitro-muriatic acids*; or a well-regulated course of Bath waters, with frequent changes of air; and in others, the artificial waters of Carlsbad, Ems, or Marienbad; and where the bowels require frequent assistance, the Seidschutz waters; have proved very serviceable.

42. *C. Treatment of Asthenic or Passive Dropsies.*—In cases where the debility is general, at the same time that vascular action is either languid, or weak—notwithstanding that the pulse is frequent—and the vital cohesion of the cellular and serous tissues is diminished, *tonics* with the *mineral acids*, especially the infusion of cinchona or the sulphate of quinine, should be prescribed. Where a cachectic habit of body is manifest, quinine will probably occasion heat and feverishness. In such cases, it will be necessary to associate the vegetable tonics with *deobstruents* and *laxatives*; to exhibit the blue pill or PLUMMER'S pill in small and frequent doses, with *taraxacum*, or the compound decoction of *sarsaparilla*, the mezereon having been left out. In many of those doubtful cases of this form of the disease, where it is difficult to determine whether it is primary, or associated with obscure lesion in the secreting substance of the liver or kidneys, some advantage will be derived from minute doses of the *oxymurias hydrargyri* in large quantities of the decoction of sarsaparilla, or of any of the species of the *smilax*. I have likewise, in such circumstances, found great service from *iodine*, particularly the hydriodate of potash, and the iodureted solution of the hydriodate, in smaller and much more frequent doses than are usually directed.

43. When this form of dropsy has arisen from excessive losses of blood, or has supervened on chlorosis, the *chalybeate preparations*, with chalybeate mineral waters, or the artificial Pyrmont and Spa waters, will be of the utmost service. But care should be taken to ascertain the non-existence of visceral obstruction before they are resorted to, and to preserve the bowels freely open during their use. When passive dropsy occurs after delivery or abortion, bitter infusions, and vegetable tonics, the decoction of cinchona with mineral acids, occasional purgatives, and the terebinthinate enema, with frictions of the surface and bandages, will be requisite; and, if it be accompanied with hysterical symptoms, the preparations of juniper, spirit. ætheris nitrici, or other ætherial preparations, with tinct. camphoræ comp., or small doses of opium, will be of much service. In these cases, the combination of diuretics with bitter or tonic infusions, and small doses of the tinctura camphoræ Thebaïca (F. 708.), or the tinct. opii camph. (F. 728.) will generally be advantageous.

44. ii. TREATMENT OF CONSECUTIVE OR SYMPTOMATIC DROPSIES.—It is obvious that the intentions of cure in this class of dropsies should have strict reference to the nature of the organic lesions concerned in the production of effusion,



and to the state of vital energy and structural cohesion; and that they should comprise the following objects.—1st. To remove these lesions, and if this cannot be accomplished, to retard their increase, as the chief means of diminishing the effusion;—2d. To promote the absorption of the fluid accumulated;—and, 3d. To support the constitutional powers; as being necessary both to the due operation of remedies, and to the exertion of that vital resistance which guards the structures against the impression of hurtful agents, whether generated within the system, and acting intrinsically, or invading them from without.

45. *A. Of dropsy consequent on disease of the heart.*—It will be important to ascertain, as correctly as the rational and auscultatory signs will enable us, the nature and seat of the cardiac lesion, in connection with the seat of effusion, and its characters in respect of activity. If obstruction to the circulation be seated in the left side of the heart, there will very probably be associated with the effusion, congestion of the substance of the lungs, which will aggravate the hydropic symptoms, and render depletion the more necessary. Also, if the cardiac disease consist, either altogether, or in part, of active enlargement of the parietes of the cavities, the dropsy will present a sthenic character, and require antiphlogistic remedies; but if the lesions be chiefly passive,—if there be dilatation with thinning or softening of the parietes of the heart,—the constitutional symptoms will possess analogous features, and the disease require an opposite—a tonic, treatment. It will be evident from these facts merely, that, in symptomatic, as well as in idiopathic, dropsy, and even in that connected with impeded circulation through the heart, the strictest reference should be had to the state of vital power and vascular action, as the principal basis of our intentions of cure.

46. If a state of sthenic action exist, *local depletion*—preferably by cupping; hydragogue cathartics, as *elaterium* and the *croton oil*, repeated from time to time; or even these independently of depletion; and subsequently the use of *diuretics*, or these at an earlier period where the active and repeated exhibition of purgatives are not well borne; will frequently remove the accumulation of fluid. In this state of the disease, *digitalis* is the most efficacious diuretic, especially after local depletions and purgatives, in the more sthenic cases. Debility rather indicates, than contra-indicates, the propriety of resorting to it. The infusion is the most certain preparation of this medicine. Half an ounce of it two or three times a day, as usually directed, is a much larger dose than that recommended of its other preparations; hence the reason of its activity, its diuretic operation being heightened by the addition of small doses of opium. If a tensive pain in the forehead, with disturbance of the cerebral functions, come on early after its exhibition, it will rarely be of service, or it may even be injurious, as remarked by Dr. BLACKALL, and it, therefore, should be immediately relinquished. When there is much debility, it should also be discontinued upon the first appearance of an increase of the urine. But even great debility is no reason against the use of this medicine, as Dr. WITHERING has shown; only the more caution is required in its exhibition. In such cases I

have usually combined it beneficially with camphor, a small quantity of opium, or with cinchona (F. 859.), and other vegetable tonics and cordials, or with F. 708. or 728. *Colchicum* is sometimes of service when this form of dropsy assumes a sthenic character, or appears in the rheumatic or gouty diathesis; but it requires much caution. It is most safe, and at the same time most serviceable, when combined with camphor or ammonia, or with the alkaline sub-carbonates, and infusion of cinchona.

47. When the cardiac disease and its consequent effusion are of a passive kind, and especially if the constitutional powers are much reduced, a tonic treatment, in conjunction with stimulating diuretics, is requisite. The remedies of this description already recommended (§ 43.),—the *infusion of quassia*, with the *muriated tincture of iron*, and tincture of *digitalis*; the compound infusion of *angelica*, (F. 219.); the decoction of *broom tops* (F. 75.), with the compound spirit of juniper; the compound decoction of *taraxacum* (F. 77.), with tincture of *calumba* or *tartarised iron*; and either Formulæ 570. 781. 859., or the following, will often be prescribed with benefit:—

No. 179. R. Potassæ Sub-carbon. ʒj.; Tinct. Cinnamon. Co. ʒj.; Spirit. Æther. Nit. ʒj.; Infus. Gentianæ Comp. ʒj.; Aquæ Anethi ʒiij. M. Fiat Haustus ter quotidie sumendus.

No. 180. R. Potassæ Acetatis ʒss.—ʒij.; Tinct. Digitalis ʒiij.; Tinct. Opii ʒv.; Spirit. Junip. Comp. ʒj.; Infus. Quassia ʒix.; Aquæ Pimentæ ʒiij. M. Fiat Haustus ter quaterve in die sumendus.

No. 181. R. Camphoræ subactæ, Guaiaci Resinæ, aa ʒj.; Pulv. Scillæ et Pulv. Digitalis aa gr. xv.; Opii Puri gr. v.; Olei Juniperi ʒxxij.; Mucilag. Acaciæ q. s. M. Contunde simul, et distribue massam in Pilulas æquales xlviii., quarum capiat binas ter in die.

No. 182. R. Tinct. Digitalis ʒx.—xv.; Liqueur. Ammonia Acetatis ʒij.; Infus. Cinchonæ et Mist. Camphoræ aa ʒvj.; Tinct. Camphoræ Comp. ʒj.; et Spirit. Anisi ʒss. M. Fiat Haustus bis quotidie sumendus.

48. *B. Dropsy from disease of the absorbing systems—veins and lymphatics.*—The difficulty of determining when the effusion is owing to these causes has been stated above, with such signs as sometimes indicate its existence (§ 25. *et seq.*). In the more limited states of anasarca, and even in ascites, *bandages* and *frictions*, assiduously employed, with the internal exhibition of the *hydriodate of potash*, or of the other preparations of iodine to be found in the *Appendix* (F. 234. 723.), have proved exceedingly beneficial in some cases in my practice. The decoction of *broom tops* with liquor potassæ, or this latter in the compound decoction of sarsaparilla; equal quantities of the sub-borate of soda and supertartrate of potass in the *decoctum cydoniæ*, or *decoctum guaiaci comp.*; the *diuretic drinks*, in the *Appendix* (F. 588. *et seq.*); and frictions with deobstruent *liniments* (F. 295. 297. 311.), will occasionally be of much service. The sub-carbonate of soda, or *nitrate of potash*, or both, exhibited in tonic infusions, to which small doses of *digitalis* are added; and the infusion of *berberis*, or the compound decoction of *taraxacum* (F. 76. 77.), with sub-carbonate of potash or of soda; or the same alkaline carbonates with the infusion or mixture of the *diosma crenata* (F. 231. 396.); may likewise be employed, with a prospect of advantage, from their deobstruent operation. In all cases of this kind, gentle exercise in the open air; the use of the artificial waters of Marienbad, and Eger, or of Seltzer or Seid-schutz; and strict attention to a moderate, di-



gestible, and cooling diet; will prove of essential benefit.

49. *C. Dropsy connected with pulmonary diseases.*—The treatment in this complication should mainly depend upon the character of the vascular action, and vital power, and the nature of the existing pulmonary lesion. If active congestion or inflammatory action be present in the substance of the lungs, or in the pleuræ, general or local depletions, or both; the internal use of *antimonial* preparations with *diuretics*; and external derivation, as pointed out above (§ 40, 41.); constitute the principal means. The same treatment is required, with the addition of purgatives, if the effusion be associated with acute or sub-acute bronchitis. In these states of the disease, the heating diuretics, as squills, ammoniacum, senega, &c., ought not to be exhibited. The supertartrate of potash with borax, or with digitalis; or any of the neutral salts, with *liquor ammoniæ acetatis*, the spiritus ætheris nitrici, or the *acetic æther*; or the preparations of *colchicum* with the alkaline carbonates, or with camphor or ammonia; are the most appropriate. In the chronic and asthenic states of pulmonary disease connected with a similar condition of the system, a tonic treatment is indispensable; and the warmer diuretics (F. 552. 570. 893.) will generally be employed with benefit, more particularly the *balsamic* and *terebinthinate* preparations (F. 22. 169. 485. 487. 571. 681. 827.), and *ammoniacum*, with the tinct. camphoræ comp. (F. 708.), or the tinct. opii camphorata (F. 728.), or the preparations of *squills* with any of the neutral salts, given in the light bitter, or tonic, or diuretic infusions. (See BRONCHITIS—Treatment of Chronic, &c.)

50. *D. Treatment of dropsy from disease of the liver and spleen.*—(a) This form of dropsy is very commonly connected with general debility, and with a cachectic state of the frame. In some cases, the colour, consistence, and vital cohesion of the soft solids are more or less changed, particularly the cellular, serous, and mucous tissues. These circumstances should not be overlooked in framing plans of treatment. Cases of this complication are comparatively rare, that require general or even local depletion. However, when symptoms of inflammation of the liver are present, *general* and *local depletions*—the latter at least—should not be omitted. *Mercurials* should also be employed, especially when the surface of this organ is the part chiefly inflamed; and occasionally externally by friction, as well as internally; counter-irritation being kept up at the same time. But it is doubtful whether or not these preparations are beneficial in the chronic lesions of the substance of the liver. I have generally abstained from prescribing them in such cases, excepting the oxymuriate, in minute doses in the compound decoction of sarsaparilla, or in the preparations of cinchona. More service will accrue from the *nitro-muriatic acid bath*, or from sponging the surface of the hypochondria, night and morning, with a warm lotion containing these acids, or from the internal use of them. The *chlorate of soda* may also be taken with advantage; but I believe that greater benefit will be derived from the *hydriodate of potash*, or the other preparations of *iodine*, given in minute doses, and continued for a due period, than from any other medicine. Either the infusion of calumba or of

quassia, or the infusion of pine tops; or the decoction of genista, or of taraxacum, with the alkaline sub-carbonates, or with the liquor ammoniæ acetatis, and spiritus ætheris nitrici; and the supertartrate of potash with sub-borate of soda, and *squills*, taken in the form of electuary, with the inspissated juice of the *sambucus nigra*, will be more appropriate when the liver is organically changed than in the other forms of the disease. The preparations of *colchicum* and *tobacco*, particularly the *tinctura tabaci composita* (F. 742.), may also be given in this complication, but with caution. They have seemed to me most beneficial when associated with large doses of the alkaline sub-carbonates, and taken in tonic infusions or decoctions; as those remedies which depress the vital powers too low are seldom productive of benefit in cases of this description. (See DROPSY—of the Abdomen.)

51. (b) A nearly similar treatment will be necessary when the spleen is enlarged, to that now recommended in cases of organic change of the liver. I believe, however, that tonics of an active kind, particularly cinchona, quinine, the preparations of iron, and the arsenical solution, either conjoined, or alternated with purgatives or diuretics, are much more necessary in this complication than in that last discussed. All the cases I have seen connected with enlargement of the spleen were consecutive of protracted agues; and in these, after exhibiting one or two full doses of calomel with camphor, and fully evacuating the bowels by means of the compound infusions of gentian and senna (F. 266.), the above tonics, prescribed as now mentioned, and assisted by frictions over the region of the spleen, were productive of great benefit. In the case of a patient from one of the most marshy parts of Essex, with this complication, the preparations of *iodine* were essentially efficacious. In this state of the disease, but little or no permanent benefit will be derived as long as the patient continues to reside in a miasmatic locality. In it, also, more than any other form, will advantage accrue from moderate exercise, change of air, sea-voyaging, and the use of the Carlsbad or Ems mineral waters,—which, with those of Marienbad, Eger, and Seidschutz, are often of service when the effusion arises from hepatic obstruction.

52. *E. Treatment of dropsy from disease of the kidneys.*—Attention has been so recently drawn to this complication, by the writings of Dr. BRIGHT, that sufficient experience of the means of treating it has not been yet acquired. I have had an opportunity of treating only three cases, in which these organs were found diseased after death, since the publication of Dr. BRIGHT's work. They were persons of broken-down constitutions, by drinking. In one of them the accumulation steadily increased, notwithstanding cupping over the loins, counter-irritation in this situation subsequently, friction with stimulating liniments, and various internal remedies, were employed. In the others, these means were of temporary benefit. The supertartrate of potash with jalap, and squills with opium or hyoscyamus, are mentioned by this pathologist as having been the most serviceable in the cases which occurred in his practice. I believe that, in a very great majority of instances where effusion proceeds from this cause, the irritating nature of the fluid poured out superinduces



inflammation of the membranes and cellular tissue containing it, and thereby aggravates the disease, and accelerates a fatal issue. That the fluid is possessed of these properties may be viewed as a postulatam; but if it be considered that, when the functions of the kidneys are interrupted, excrementitious or serous plethora (see BLOOD, § 19.) will be the result; and that the watery parts of the blood, which are effused from this cause, must necessarily contain a considerable quantity of the injurious matters usually eliminated by these organs; the irritating quality of the accumulating fluid here contended for will be admitted. In the cases seen by me, consecutive inflammatory action appeared in the seats of effusion; and a similar occurrence took place in most of those detailed by Dr. BRIGHT. When this complication is attended by debility or diarrhœa, the propriety of employing tonics, with diuretics and opiates, as cinchona or quinine with the mineral acids or squills, cannot be doubted; and, when the bowels are constipated, or when diarrhœa is not present, free alvine evacuations by purgatives combined with bitter tonics, which increase their operation, will be productive of benefit. I believe that there are few cases of this form of dropsy that may not admit of the judicious exhibition of strengthening medicines, when a free action is exerted on the bowels; that the diarrhœa and tormina which sometimes accompany it, are seldom attended by copious evacuations, but require that they should be procured by medicine; that the *balsams* and *terebinthinates*, either conjoined with these, or trusted to chiefly alone, or with small doses of opium, will prove more beneficial than other diuretics; and that a lowering or antiphlogistic treatment has been too generally adopted, as well in cases of this description, as in others where coagulable urine is observed, owing to the mistaken notion that this symptom always indicates inflammatory or sthenic action.

53. *F. The treatment of dropsy from disease of the uterus or ovaria* will depend upon the state of vital power and vascular action. Although very generally evincing an inflammatory character, and connected with suppression of the sexual discharges, yet it is often associated with depressed vital or constitutional power, at least in those instances which have come before me. When, however, it supervenes on chlorosis, it is altogether a disease of debility. In the former class of cases, local depletions, cooling aperients and diuretics with gentle tonics; the nitrate of potash and sub-carbonate of soda, with the spiritus ætheris nitrici and hyoscyamus in the infusion of cinchona, or of calumba, or of juniper berries; the supertartrate of potash with sub-borate of soda; the expressed juice of the sambucus nigra and syrup of squills; and frictions with oleaginous or terebinthinated liniments (F. 297.311.); may be severally employed; but the treatment should mainly depend upon the presumed state of the primary disease, of the consecutive effusion, and state of vital power. The object, in this form of the disease especially, should be to remove the primary lesion; for when this is accomplished, the effused fluid will soon be absorbed. When the disease follows *chlorosis*, the preparations of iron, the *mistura ferri composita*, the sub-carbonate of iron with electuary of senna and oxymel of squills; the preparations of juniper with cinchona, &c.,

with change of air; horse-exercise, the chalybeate mineral waters, and warm clothing, will generally be efficacious. I had recently a case of this description under treatment, both whilst it was simple chlorosis, and when water had collected in the abdomen and lower extremities. I was surprised at its resisting the free use of chalybeate and other tonics; when I found that the patient had entertained a dislike to salt, and to food which contained it, and had long avoided it. The cause of the general and extreme cachexia was now evident: the use of salt was enforced; the chlorate of potash was also prescribed alternately with the preparations of iron, and recovery soon took place.

54. ii. NOTICES OF THE MEDICINES RECOMMENDED IN DROPSIES BY AUTHORS, WITH PRACTICAL REMARKS.—Having, in the foregoing sections, stated chiefly the results of my own experience, I now proceed to notice, under distinct heads, the means advised by respectable and original authorities for the treatment of this class of diseases. The remedies recommended in the cure of dropsies have usually been directed with the following intentions:—1st. *To remove the state of vascular action, and vital power giving rise to effusion*—(a) by refrigerants, comprising vascular depletion and other antiphlogistic remedies; (b) by sedatives; (c) by external irritation; (d) by tonics and astringents; and (e) by a combination of two or more of these;—2d. *To remove obstruction to the circulation, and to promote the absorption and discharge of the accumulated fluid*—(a) by deobstruents, frictions, and bandages; (b) by purgatives and hydragogue cathartics; (c) by diuretics; (d) by emetics; (e) by sudorifics; and (f) by various combinations of them;—and, 3d. *To evacuate the fluid by surgical aid*—(a) by blisters and scarifications; (b) by acupuncture; (c) by paracentesis. Of these last means notice will be taken when the specific states of dropsy in which they have been employed come under consideration.

55. 1st. *To remove the State of Vascular Action and Vital Power giving rise to Effusion.*—A. *By refrigerants, &c.*—(a) *Vascular depletion*, general or local, or both, has been advised in the acute states of the disease from HIPPOCRATES up to the present day; and has been more particularly insisted on by MESUÉ, BONET, AASCHEIM, SCHULZE, BRUELE, JUNCKER, STOLL, TISSOT, RUSH, OBERTEUFFER, GRAPENGIESSER, BLACKALL, ABERCROMBIE, GRAHAM, VENABLES, and AYRE. The propriety of repeating it has been shown by J. P. FRANK, Dr. GRAHAM, and some later writers; although the number of cases that can admit of the repetition of general bloodletting will be comparatively small, and those only in the young or unbroken constitution.—(b) *Nitre* has been very generally prescribed, not merely as a refrigerant, but as a diuretic. RUSH attached some importance to it after venæsection, directing it with *spare diet*; and ROSIER and OBERTEUFFER, with squills.—(c) The *muriate of ammonia*, in doses of ten grains to a scruple, has been given by me in some cases consequent upon ague with benefit; and is appropriate not only to acute and sub-acute cases, but also to the more passive states of the disease, particularly when taken in tonic or warm diuretic infusions, and conjoined with ammoniacum.—(d) *Low diet* has been especially noticed by TISSOT and RUSH.



56. *B. By sedatives.*—(a) *Antimonials* may be more appropriately considered as sedatives than as diaphoretics, inasmuch as their operation in the latter capacity arises from their sedative influence on vascular action. *James's powder* and *tartar emetic* are the preparations of this class most to be depended upon, and are sometimes useful in the acute and sub-acute forms of the disease, conjoined with calomel, or with cream of tartar. They have been prescribed in such cases by VAN HELMONT, SYDENHAM, MYNSICHT, and RICHTER. With squills and saline diuretics, they have been employed by BRISBANE and WILlich.—(b) The diuretic operation of *tobacco* is evidently owing chiefly to its *sedative* influence on the circulation. This active substance is indicated in the more acute states of the disease, but it may also be exhibited with tonics and stimulating diuretics, where the debility is more manifest. It has been recommended in the form of powder, infusion, wine, or tincture, by MAGNINUS, BARTHOLIN, FOWLER, NEANDER, GARNETT, and BALDINGER. Dr. FOWLER advises the *infusion* in gradually increased doses; GARDEN, its ashes with *rhubarb* and sulphate of iron; and some Continental writers with camphor in the form of *tincture* (see F. 742.), which may be added to other medicines. The *ashes* of tobacco are very frequently mentioned by the writers of the last century, but their operation can depend only on the quantity of vegetable alkali they furnish.—(c) Several of the *solanaceous* order of plants, besides tobacco, have been employed in dropsies, both as the principal means confided in, and in order to assist, by their sedative and diuretic operation, other medicines possessed of less equivocal diuretic properties. The *belladonna*, the *physalis alkekengi*, the *solanum dulcamara*, the *s. somniferum*, and the *s. nigrum*, have been employed by STOËRK, BALDINGER, STARK, and others, with this intention. The *hyoscyamus* has also been very frequently prescribed, with the view of diminishing irritation and promoting the action of other medicines; but it is inferior to—(d) *opium*, in this respect, the good effects of which in dropsies have been particularly noticed by WILLIS, ARNEMANN, BROCKLESBY, RITTER, BAKER, and MASON. Its influence in determining and heightening the effects of diuretics has been shown by LENTIN and PARIS. DOEMLING always added it to *squills*; and LEAKE, to this medicine and cream of tartar.—(e) The *lactuca virosa* has also been recommended to fulfil the same indications with the above by COLLIN, DURANDE, and RICHTER, particularly in conjunction with *digitalis*—two grains of the extract of the former, with half a grain of the dried leaves of the latter, finely triturated with white sugar, and taken three or four times a day. The foregoing sedatives, as well as the *colchicum* (§ 80.), will be found very useful adjuncts, and indeed not infrequently the chief means that should be resorted to when the disease is attended with much pain, or with spasms or cramps.

57. *C. By external irritation.*—It is but rarely that external irritants give issue to a quantity of serum sufficient to unload very considerably the vascular system: but in the acute, and especially in the sub-acute, states of the disease, after depletions, a judicious use of them is often productive of benefit, by transferring the irritation sometimes occasioning the effusion, from the in-

ternal parts. They are applicable chiefly to dropsies of the thoracic cavities, depending upon pulmonary disease, to those consequent on scarlatina, and to ascites. The means by which counter-irritation should be effected is an important consideration. In the states and species of the malady now alluded to, the *tartarised antimonial ointment*, or *issues*, may be preferred; or blisters may be applied in the more asthenic and rapidly progressive cases. When the effusion seems owing to obstruction of the liver, *blisters*, several times repeated, over the right hypochondrium, and below the right shoulder-blades, or *rubefacient plasters* in the same situation, are sometimes of much service. When the kidneys are apparently affected, they may be applied over the loins, after cupping in that situation; or the tartarised antimonial ointment may be used. In the more sthenic cases, or when the urine is very thick and scanty, it will be preferable to apply fine tissue paper between the skin and the blister, or to dip the plaster in boiling water before applying it, in order to prevent the absorption of the irritating principle of the flies. In some cases, scraped horseradish, or the inner bark of the mezereum, will prove excellent counter-irritants; or mustard poultices may be used for this purpose. I have, in several cases, however, seen more benefit arise from the application of a cloth moistened with either of Formulæ 296. 300. 311. in the Appendix, or with spirit of turpentine, over the seat of disease, than from any of the foregoing. The inflammatory irritation they occasion is never followed by unpleasant results, as in the case of blisters, which, in the old and debilitated especially, sometimes produce dangerous effects if not carefully watched.

58. *D. By tonics and astringents.*—These medicines are often necessary in some of their various combinations, even in cases where it is necessary to resort to vascular depletion, and not infrequently after this practice has been employed. Much, however, will depend upon the selection of these medicines, and the mode of exhibiting them, appropriately to the pathological states of the case. The observations already offered will assist the practitioner, with a due exercise of his own discretion, in this important matter. Tonics and astringents are indispensable in all the passive or asthenic states of the disease, associated either with diuretics or with purgatives; and in many of the sub-acute and even acute forms, after the antiphlogistic treatment has been prescribed, particularly when conjoined with cathartics. They are especially indicated where the effusion seems to depend chiefly upon an atonic state of the extreme vessels, and deficient vital cohesion of the cellular and serous tissues, with flaccidity of the soft solids generally. In cases of this description they have been directed by most writers, and even by J. P. FRANK and RICHTER, by whom the inflammatory and sthenic states of effusion have been so ably investigated.

59. (a) Of the particular tonics that may be employed, the preparations of *cinchona* and *sulphate of quinine* are the most generally applicable. They have been especially noticed by LENTIN, DE HAEN, BROUGHTON, and RING. The *infusion* or *decoction* of bark is an excellent vehicle for the alkaline and saline diuretics, as well as for several purgatives, the action of which



it tends to promote. LETTSOM gave cinchona with squills; LYSON, with serpentaria, either in tincture or infusion; J. P. FRANK, with juniper; HORN, with the balsams or turpentine; and VOGEL, with the neutral salts, or sub-carbonates of the alkalies. Where the sthenic diathesis may seem to contra-indicate its use, the infusion will be advantageously associated with the nitrate of potash and sub-carbonate of soda, and with appropriate diuretic tinctures or spirits. It may also be given with the mineral acids and æthers, especially the muriatic or sulphuric. The *sulphate of quinine* may also be taken in the compound infusion of roses, or of orange peel, in conjunction with the sulphates of magnesia, or of potash, or of soda, and any diuretic spirit or tincture.—(b) The *infusion of calumba*, of *quassia*, and of *gentian*, have been exhibited in similar states of the disease, and combined with the same substances, as cinchona.

60. (c) The preparations of *iron* have been as generally prescribed in dropsies as those of cinchona; and, as in respect of them, with the object of imparting tone to the minute vessels, and thereby of diminishing effusion, and of preventing its recurrence after the fluid has been directly removed. This class of tonics was much employed by DOVER, BLACKMORE, BERGIUS, TISSOT, GRIEVE, FRANK, and RUSH. The combination of chalybeates with purgatives is advised by RIEDLIN and THOMANN. DOVER recommended an electuary consisting of the sulphuret of iron, scammony, and crude mercury; of which Dr. BLACKALL has made favourable mention. FOUQUET directed it with sulphur. The *ferrum tartarizatum* and the *muriated tincture* are the preferable preparations; but the sulphate or sub-carbonate may likewise be used. An electuary containing the tartarised iron, the confection of senna, the inspissated juice of the sambucus nigra, and the syrup of squills, will often prove serviceable in asthenic states of the disease.—(d) The *absinthium*, in the form either of infusion, wine, or powder, was formerly much employed; and was praised by CELSUS, BONET, HARTMANN, and many others, particularly when given in conjunction with juniper, or other diuretics. It has now undeservedly fallen into disuse.—(e) Of the stimulating tonics, *phosphorus* has been prescribed, in minute doses, and usually dissolved in oil or æther, by LOEBEL, GAULTIER DE CLAUVERY, and others: it has likewise been used externally in oleaginous liniments.—(f) *Insolation*, or exposure to the sun's rays, has been recommended by CELSUS and PORTAL.

61. (g) Several of the astringent tonics have been directed in various combinations. The *sulphuric acid* was recommended by MONDSCHEN, HALLER, TISSOT, BANG, and HARTMANN; and was frequently given with the infusion of the bark or of the flowers of the sambucus nigra, or the infusion of quassia, or of cinchona. The *muriatic acid* was also exhibited in similar states of combination by RIVERIUS and DIGBY. The *nitric acid*, either alone, or with the muriatic in equal proportions, has been very commonly employed, both internally and externally, by practitioners in the East Indies, in cases depending upon hepatic disease (§ 50.).—(h) The *sulphate of copper*, in doses of half a grain each, with opium, has been praised by WRIGHT.—(i) In addition to these,

the *centaurium minus* and the *inula campana* have been noticed by GRÜLING and others, who have prescribed them in the form of wine or beer; and the *prinos verticillatus*, by BARTON.—(k) The mineral waters of *Pyrmont*, *Spa*, *Bath*, and *Tunbridge*, have been severally directed in cases for which tonics are appropriate. Dr. PERCIVAL recommended the natural and artificial waters which contain *fixed air*. SCHENCK, QUARIN, GILCHRIST, J. P. FRANK, and several other writers, mention in favourable terms *change of air* and *sea-voyaging*.—(l) Most of the ancients, with FULLER, RUSH, and some others of the moderns, have insisted on the good effects of active exercise in the open air. When the patient is able to adopt this advice, there can be no doubt of its great efficacy.

62. D. *By a combination of two or more of the foregoing plans of cure*.—I have already remarked that depletions are not infrequently requisite to a moderate extent, in order to remove relative or excrementitious plethora, even although vascular action may not be increased; and there is often a necessity for the exhibition of tonics at the same time, generally with purgatives or diuretics. The propriety, however, of associating sedatives with the various antiphlogistic measures noticed above, and counter-irritation with both, in the inflammatory or acute states of the disease, is still more manifest. The combination, also, of some one of the sedatives with the tonics or astringents, whether these latter be given alone, or conjoined with one or more diuretics or deobstruents, is generally found useful, not merely in promoting their operation, but also in relieving the more uneasy sensations which frequently occur during the progress of the disease.

63. 2d. *To remove Obstructions to the Circulation, and to promote the Absorption and Discharge of the accumulated Fluid*.—This indication comprises three objects,—the removal of *obstruction*, the promotion of *absorption*, and the augmentation of the *urinary discharge*. These, however, are so intimately connected, that the attainment of the first is generally followed by the second and third.—A. *By deobstruents, and the use of frictions and bandages*.—These means are obviously appropriate to cases of dropsy depending chiefly on congestion of the large veins, or to obstruction either of them or of the lymphatic system (§ 48.). Many of the remedies which are supposed to act upon the kidneys, operate in some respects by removing obstructions to the venous and lymphatic circulation, and increasing the action of the absorbents. Those substances which have been very commonly termed *deobstruents*, pass into the blood by the veins or lymphatics, where they either modify its condition, or excite the extreme vessels when they are congested, thereby accelerating the circulation through them and the veins, and removing the state that favours increased exhalation.—(a) *Mercurial* preparations are amongst the most common medicines employed as deobstruents. But they are not always applicable; for when the dropsy is connected with organic change in the substance of the liver, they should be given with circumspection. When the obstruction exists chiefly in the venous and lymphatic systems, or depends upon disease of the heart; or when



the effusion is caused by increased action in the serous membranes; they are valuable medicines. The scrofulous diathesis and weak vital energy are not always satisfactory reasons against their use, although these states of system require a peculiar mode of exhibiting and combining them. In acute cases, *calomel*, with antimony or camphor and opium, is the preferable medicine. In this and similar states of preparation, it has been employed by LYSONS, LANGGUTH, HAMILTON, BECKER, and others. Where active disease exists in the pleuræ, pericardium, peritoneum, or surface of the liver, this is the best mode of exhibiting mercurials; but where there is much *debility*, this medicine should be given in small doses with soap, and guaiacum, as advised by RIEPENHAUSEN; or in the form of PLUMMER's pill, with soap and taraxacum. In an atonic or asthenic state of vital action, as well as in the scrofulous diathesis, small doses of blue pill, similarly combined; or of the *sublimite*, dissolved in the compound decoction of sarsaparilla, or tincture of cinchona, with diuretics; will be found both safe and beneficial medicines. Mercurials have been directed to be pushed to salivation by many authors; and in cases where the disease is connected with inflammatory action in the serous membranes, and when vascular depletion has been previously instituted and carried sufficiently far, the practice is beneficial. It is likewise applicable when there is evidence of inflammation of the surface of the liver, as indicated by pain, soreness, and tenderness of its region, &c. In the more chronic and asthenic states of disease, mercurials have been directed to be given with squills, by FISCHER and other writers; and with tonics, by WRIGHT.

64. (b) *Iodine*, variously combined, has proved, in several cases of dropsy in which I have employed it, a most valuable deobstruent and diuretic. It is not applicable to the cases arising from disease of the serous membranes, and heart; but when the effusion proceeds from obstruction in the liver, or in the spleen, or in the veins and absorbents (§ 26, 27. 31.), it seems to me more to be depended upon than any other medicine. I have prescribed it in the form of *tincture*, *hydriodate*, *idioruttet solution of the hydriodate*, and of *ioduret of mercury*, both internally and externally, according to the circumstances of the case; and have more frequently preferred the second and third of these preparations; but when the debility is great, the tincture is, perhaps, more to be depended upon than the others.—(c) The fixed *alkalies* and their sub-carbonates have had much repute in dropsies, and were very commonly employed by SYDENHAM, QUARIN, J. P. FRANK, and most recent writers. Although generally used as diuretics, they act chiefly as deobstruents, particularly when combined with taraxacum, small doses of antimony, or of mercury. In cases of debility, they are extremely useful with the tonic or warm diuretic infusions or decoctions,—as the infusion of cinchona, of juniper berries or pine tops; and they may be also associated with the nitrate of potash and diuretic spirits or tinctures. Or they may be prescribed with myrrh, or guaiacum, or sulphur, or ammoniacum, or squills, or camboge, or the extract of black hellebore, according to the peculiarities of the case.—(d) The *sub-borate of soda*

is a very useful adjunct to other deobstruents, and to diuretics (see F. 57. 397. 599.). I believe that its deobstruent action is greater than that of the alkaline carbonates.—(e) *Ammoniacum* has also been exhibited, chiefly on account of its deobstruent operation, and is indicated in the atonic states of the disease, and in the complications with organic change in the liver, spleen, or kidneys; and in cases of venous, absorbent, or glandular congestion or obstruction. In these it may be conjoined with alkalies, extract of taraxacum and squills (see F. 552. 893, 894.). FORDYCE gave it with antimony and nitre,—a form in which it may be safely prescribed in the acute and sub-acute cases, after vascular depletion and purgatives; and RICHTER, with the muriate of ammonia and squills.—(f) *Sulphur*, when judiciously associated with other deobstruents and aperients, or with diuretics, possesses no mean deobstruent properties, more particularly when given with cream of tartar, as HUFELAND advises; or with this substance, the *sambucus nigra*, and the sub-borate of soda; or with the nitrate of potash, and squills; or with the balsams, as directed by MONDSCHIEIN.

65. (g) The *external deobstruents* consist of certain of the substances already noticed, kept constantly applied over the chest, or the loins, or hypochondria, in the form of *plaster*; or assiduously rubbed into the same places, in the form of *liniment* or *ointment*. The *Appendix* will furnish, under these heads respectively, several preparations, consisting chiefly of ammoniacum (F. 109. 117. 891.), the preparations of iodine (F. 302. 768. 775.), of the terebinthines (F. 120. 296. 297.), of mercury (F. 511. 761.), of camphor (F. 115. 306. 758.), and of the sulphurets (F. 309. 776.), with other substances; calculated to promote their operation, and allay internal pain and vascular irritation. Besides those now indicated, will be found arranged along with them, several preparations which may also be used according to circumstances.—(h) *Frictions* are of more benefit in dropsies, particularly in those which depend upon obstruction and atony of the vessels and tissues, than is usually imagined; and were commonly employed by STOËRCK, STOLL, RUSH, WRIGHT, and others. They will be advantageously used with the *liniments* or *ointments* already noticed employed in weaker forms. Frictions with the weak *mercurial ointment* were advised by BROUGHTON, FRANK, and KNIGHT; the addition of camphor to this liniment, as recommended by LENTIN, or the linimentum hydrargyri reduced by the addition of olive oil, or of the linimentum saponis compositum, will be found superior to the mercurial ointment alone. Frictions with olive oil were much confided in by STOLL, OLIVER, CHAMBERLAINE, LANGE, GARDANE, RUSH, and WRIGHT, particularly in ascites and anasarca; and are certainly often beneficial in favouring a free transpiration from the surface, and do not merit the disuse into which they have fallen.—(i) The good effects of *bandaging*, not merely in anasarca, but also in ascites, were insisted on by RUSH; and have lately been shown, in the latter form of the disease, by some French practitioners.

66. B. By *purgative and hydragogue cathartics*.—Purgatives are very generally applicable in dropsies—(a) on account either of their *ecco-*



*protic* action, or of their deobstruent operation when uninterruptedly continued, or of their influence in deriving from the seat of effusion, in draining the fluid parts of the blood from that circulating in the intestinal tube, in thereby lessening excrementitious or serous plethora and favouring the absorption of the effused fluid. They constitute a most important part of the treatment of every form and state of the disease, according to the selection of them and the manner of combining them. Thus, calomel and antimonials, subsequently to bloodletting, are most appropriate to the inflammatory, the pulmonary, and cardiac complications; the hydragogue cathartics in ascites and anasarca; and the milder purgatives associated with tonics and diuretics in the atonic or passive forms. The advantages to be derived from conjoining the saline purgatives with bitter infusions and with diuretics, even in the acute states of the disease, after the antiphlogistic treatment has been directed, should not be overlooked (§ 59.) The combination of purgatives and cathartics with tonics and diuretics, was adopted by SCRIBONIUS LARGUS, FORESTUS, RIEDLIN, SYDENHAM, THILENIUS, BACHER, WINCLER, RITTER, GRIEVE, and most recent writers: the chief difference being as to the choice of substances, and the appropriation of them to the various states and forms of dropsy.—(b) The *deobstruent* effect of purgatives is most certainly obtained from moderate doses of *jalap* with cream of tartar; or from the extract of *black hellebore*, with myrrh, ammoniacum, and soap; or from *Plummer's* pill, with camboge, soap, and taraxacum, given in moderate doses daily, and long persisted in.

67. (c) A *hydragogue* operation is produced chiefly by elaterium, croton oil, camboge, the inner bark of the common or dwarf elder, the *rhamnus catharticus*, hellebore, and the neutral salts.—*a.* *Elaterium* is often productive of benefit. It was much employed by SYDENHAM and DEMIANI, and is still very generally prescribed. It is given with soap or any tonic extract, in doses of half a grain every hour, until copious watery evacuations are procured. The following pills will be found the most certain in their operations:—

No. 183. R. Extr. Elaterii gr. vj. ; Potassæ Sulphatis gr. x. : tere benè simul, dein contunde cum Pulv. Radicis Zingiberis ʒj. ; Saponis Duri gr. xvj., et forma in massam cum Olei Anisi ℥vj. vel q. s. Divide in Pilulas xvij., quarum capiat unam, duas, vel tres, omni horâ.

68. *β.* *Croton oil* is one of the most certain hydragogue cathartics that can be employed. It may be given with soap and compound extract of colocynth (F. 543.), or with the aloes and myrrh pill, in doses of about half a drop every two or three hours, until it operates copiously. Dr. NIMMO and Dr. GOOD prefer the alcoholic solution of this oil, but of that I have had no experience; I have found the mode in which I have directed it answer my expectations.—*γ.* The *extract of black hellebore* has been much used in all drop-sical cases. This plant was very commonly employed by the ancients, and by AVICENNA, RIEDLIN, MONDSCHIEIN, VAN SWIETEN, and QUARIN. The *extract* as prepared (F. 156), and combined, by BACHER, is, upon the whole, the best mode of exhibiting it. It should be fresh, and its effects carefully watched. If it produce restlessness and anxiety, it ought to be relinquished. The following is BACHER's recipe for the pills known by his name:—

No. 184. R. Extr. Hellebori Nigri, Myrrhæ, āā ʒ ss. ; Pulv. Cardui Benedict. 3 jss. Contunde secundum artem in massam æqualem. Capiat gr. ij. ad vj. ter quaterve quotidie.

69. *δ.* The *sambucus nigra* and *s. ebulus*—the common and dwarf elder—were praised by FORESTUS, SYDENHAM, SCHROEDER, FOUQUET, BROCKLESBY, QUARIN, CHESNEAU, and LANGE. The inner bark is cathartic, and the flowers both purgative and diuretic. The infusion, inspissated juice, and powder, may be used. It has been almost entirely neglected by recent writers, but I have prescribed it with much benefit.—*ζ.* The *rhamnus catharticus* was likewise employed by SYDENHAM, and is still used in the form of syrup. *Camboge* is often very efficacious when triturated with supertartrate or sulphate of potash. HOFFMANN prescribed it in an alkaline solution; RICHTER, dissolved in oil; and ACKERMANN, finely levigated with white sugar or cream of tartar.—*Jalap*, either its powder or its extract, has been very generally used. GRIEVE gave it with nitre, and VAN SWIETEN with turbith mineral.

70. *ε.* Dr. HORNE and Dr. FERRIAR placed great reliance on the *supertartrate of potash*. I have employed it more than any other medicine in the acute forms of the disease, after the exhibition of mercurials, sometimes in very large doses, in the form of electuary, and variously associated. In these, as well as in other states of the disease, it often proves more efficacious than its purgative or diuretic operation indicates. Either alone, or with the sub-borate of soda, it often succeeds in removing obstructions from the liver, and accumulations of bile from the hepatic ducts, after other medicines had been directed with this intention to no purpose. It may be given in as large doses as Dr. THOMSON and Dr. GOOD have stated (3vj. and ʒj.); but two or three drachms twice or thrice in the day, and persisted in for several days, is preferable. It is apt to be nauseated by the patient; in which case the electuary should be prepared with syrup of ginger, to which the oleum anisi, and a little tincture or powder of capsicum, may be added in addition to the other substances with which it may be requisite to conjoin it. In some cases, sulphur will be added to it with advantage; in others, guaiacum, ammoniacum, or squills; and in some the inspissated juice of the *sambucus nigra*, and extract of taraxacum. Its association with *sulphur* was much confided in by PIDERIT; with *borax*, by GRANT, QUARIN, and most Continental writers; with *camboge*, intimately triturated together, by SALA and others; with *squills*, by BANG; and with *jalap*, by DEMIANI. Of other purgatives it is unnecessary to take any particular notice. The *neutral salts*, particularly the *sulphates*, are often of great benefit, both as laxatives and as diuretics, when prescribed with other preparations possessed of the latter properties. The *iris florentina*, *i. pseudacorus*, *i. vulgaris*, *i. versicolor*, and *i. fœtidissima*, have severally been employed as hydragogue cathartics in dropsies, in the form of the expressed juice, or powder, infusion and decoction of the roots, and have received the commendations of PLATER, ELLER, DUVERNEY, and SPINDLER.

71. *C.* *By diuretics.*—This class of medicines is, perhaps, more than any other, empirically prescribed in dropsies, owing chiefly to the imperfect state of our knowledge of, and in some measure



to want of attention to, the mode of their operation. From researches into this subject, in which I was engaged during the years 1819, 1820, and 1821,—part of the results of which, particularly in respect of diuretics\*, was published in the *Medical and Physical Journal* for July and August, 1821, p. 112—115.—it was there shown, that these substances act — i. *Upon the digestive canal, and on the nerves of organic life, exciting or otherwise modifying, according to the nature of their impression, the functions of these viscera, and by sympathy the functions of those intimately related to them:*—ii. *By absorption, and by their action on the lymphatic, capillary, and venous systems, both during and subsequently to their passage into the blood,*—a. in exciting the extreme vessels, or restoring their tone, and thereby promoting their circulating functions; b. in exciting the absorbent system, and gradually removing impediments in the way of the lymphatic and venous circulation, or in producing a deobstruent operation; c. in developing constitutional power, increasing the vital cohesion of the soft solids, and enabling them to yield the requisite support to the capillaries and to the exhaling vessels and pores:—iii. *By their action on the kidneys, and other secreting and excreting viscera, through the medium of the circulating fluid,*—a. in directly stimulating the kidneys, by one or more of their constituents, during their presence in the blood and elimination with the urine, and in exciting them to excrete the watery parts of the blood; b. in thereby diminishing the quantity of the watery parts of the blood, and promoting the absorption of fluid from the cavities or tissues in which it superabounds. It will be seen from the above, that substances which have had a diuretic action ascribed to them, operate—1st, in a more or less *indirect manner*, whether their influence be mainly exerted upon the *prima via*, or upon the circulating systems and tissues by means of absorption; and, 2d, in a *direct manner*, during their circulation through these organs, and elimination from the blood by their agency. Conformably with these views, I proceed to notice the use of this class of medicines in dropsies.

72. 1st. *Indirect diuretics.*—(a) *Those which act chiefly upon the digestive canal.* Under this head may be comprised most of the tonic and stimulating medicines already noticed, and which, by increasing the organic nervous energy, and promoting the digestive and assimilating functions, also assist the circulating and eliminating actions, particularly in the indirect manner already noticed.—(b) These effects are both accelerated and heightened by associating these medicines with *substances which, being absorbed into the circulation, excite the extreme vessels, restore their tone, and promote a healthy circulation through them.* Of these last, some mention has been already made under the head of *deobstruents*

\* The former of these memoirs contained the first attempt that had been made to determine the precise way in which diuretics operate, and to arrange their effects. In that article, as well as in the *London Medical Repository* for May, 1822, p. 380, 381., will be found the arrangement of the action of diuretics given above, drawn in a more precise and detailed manner than my limits will here allow me. I state this, because similar arrangements have been put forth at much later periods than the last of these, but without reference to the original sources now referred to.

(§ 63—66.). *Mercurials*, when used as diuretics, operate chiefly in this manner, unless carried to the extent of injuring the constitutional powers, and of hazarding the production of their peculiar cachexia. *Foxglove* seems to act chiefly in this way, as well as in lowering the frequency and strength of the heart's action, thereby diminishing effusion, and determining the balance of action in favour of the absorbing vessels. Its effects are promoted by combining it with substances which, being received into the circulation, act in a similar manner with it, or in one of the modes mentioned in the second order of the above classification (§ 71.); more particularly with the blue pill, or minute doses of the oxymuriate of mercury; with the nitric or nitro-muriatic acids, in broken-down constitutions, or where mercury has been already employed; with the spiritus ætheris nitrici, or liquor ammoniæ acetatis; with the supertartrate of potash and borax; or with colchicum and the tinctura camphoræ composita (F. 195. 395. 400. 599. 627. 859.). The diuretic operation of digitalis is most certain after depletions and alvine evacuations in the more acute states of dropsy, in the atonic forms of the disease, and in the complications with lesions of the heart and lungs. The preparations of this plant necessarily depend for their efficacy upon the period at which they are gathered, and the manner of drying them. As soon as the leaves or powder lose the green colour, they also lose their active properties. Digitalis was much recommended by SCHIEMANN, WITHERING, DARWIN, I. WARREN, DICK, ODIER, HEUSINGER, and many others; and it still retains its reputation, particularly in hydrothorax. FERRIAR prescribed it with cream of tartar; LANGENBECK, with opium; and BEDDOES, ACKERMANN, KNAUS, and LETT-SOM, with calomel and opium. The addition of small doses of this last promotes its operation, and partially counteracts any unpleasant effect it may produce,—a fact which I have heard confirmed by the extensive and discriminating experience of Sir H. HALFORD. The tinctura opii composita (F. 729.) is perhaps the most eligible preparation for this purpose. The *decoctum senegæ* has also a diuretic effect, and evidently from its influence on the capillary circulation. It was used by MILLMAN; but is applicable chiefly to the atonic states of the disease. OBERTEUFFER conjoined it with cream of tartar, which is, I believe, the best way of giving it. *Squills* and *ammoniacum* (§ 78.) seem to act, partly at least, in the present mode; but, of the former, more particular notice will be taken in the sequel.

73. (c) Diuretics which *excite the absorbing vessels, and remove impediments to the lymphatic and venous circulation*, are manifestly few in number. It is probable that several of those already noticed, and usually termed deobstruents, operate partly in this manner; but we have no satisfactory proofs that they do so act, as to any of them, excepting the *preparations of iodine*, of which mention has already been made (§ 64.). These evidently excite the absorbing vessels, and produce a diuretic action in this way, particularly when given in full doses. The sub-carbonates of the *alkalies*, the pure fixed alkalies, ammoniacum, mercurials, &c. may probably also act partly in the same manner.



74. (d) There are various substances which exert a diuretic operation through the medium of the circulation, by developing constitutional power, increasing the vital cohesion of the soft solids, and thereby restraining morbid exhalation or effusion. In this manner, all the tonic and astringent mineral salts may indirectly increase the secretion of urine, as well as the mineral and some of the vegetable acids. LENTIN, TISSOT, WINTRINGHAM, and others, prescribed the *mineral acids*; REUSNER directed the sulphuric acid, with infusion of the bark or flowers of the *sambucus nigra*: and BANG, the *tartaric acid* with squills. *Citric acid* and lime juice have been found efficacious in the complication of dropsy with scurvy; and I have seen benefit derived from *pyroligneous acid*. *Sulphate of iron*, and *sulphate of quinine* with sulphuric acid, will also prove of service in the asthenic states of the disease, by operating in this manner. But these are, upon the whole, inferior to the *ferrum tartarizatum*, which, whilst it increases the tonicity of the extreme vessels and soft solids, produces a very manifest diuretic action.

75. 2d. *Direct diuretics*.—Substances which stimulate the kidneys through the medium of the circulating fluid are the only direct diuretics. But there are very few of them which act in this way solely; nearly all of them producing more or less effect upon the organic nervous system, on the vascular systems, and on the vital cohesion of the tissues, during their presence in the blood. It will be found that such of them as excite the kidneys most remarkably are eliminated from the blood by these organs, and it may be therefore presumed that their influence is principally or specifically exerted upon them. It will be manifest, that substances which increase the proper function of the kidneys will produce the double effect above stated (§ iii. a. b.), of excreting the watery parts of the blood, of diminishing excrementitious plethora, and thereby increasing the absorption of fluid from the situations where it superabounds. I have long since shown (*Lond. Med. and Phys. Journ.* for July, 1821.) that certain diuretics, and these the most active, are conveyed into the circulation, and to the kidneys, unchanged; and Dr. PARIS has contended that various other diuretics are decomposed or digested, and operate by means of certain of their active constituents. This seems very probable as to some, but does not admit of proof in respect of many of them. That the balsams, juniper berries, and cubebs, excite the kidneys by means chiefly of their essential oil, is very evident; but that colchicum and squills are diuretic, owing to the separation of veratria and scillitina, is merely a matter of opinion.

76. (a) *Oil of turpentine*, and substances containing it, as the Canadian, the Chian, the Venetian, and the common turpentines, are the most energetic and direct diuretics that can be prescribed; and, in the endless forms of combining and exhibiting them, admit, in the hands of the practitioner who is acquainted with their properties and effects, of very general application: as they excite the tonicity of the extreme vessels and soft solids, during their presence in the circulation; stimulate the kidneys, in the asthenic states; lower inflammatory action, and prevent the consecutive effusion, in the acute forms of the

disease. The oil, the active principle, may be taken as prescribed in the Appendix (F. 149. 169. 681.), may be exhibited in clysters, and employed externally in the form of liniment or epithem. Its smell may be covered by the *cajeput* or *lemon* oils, which also are direct diuretics; and the unpleasant eructations it occasions, in great measure prevented by giving it with magnesia, or by taking this substance immediately after it. In the asthenic states of dropsy, MONDSCHNEIN and RULAND combined it with *sulphur*, in the form of *balsamum sulphuris* (F. 22.). The former of these writers also recommended the infusion of *pine tops* (F. 51.), which is an excellent diuretic vehicle for the saline substances and spirituous tinctures belonging to this class of remedies (F. 827.).—β. The various *balsams* (F. 485—487. 570.) are especially indicated in the more passive states of dropsy, and when the kidneys seem to be diseased. The Peruvian balsam was much praised by DE HAEN; but *copaiba* is equally efficacious. These, as well as the terebinthines, may be given in the form of pill with magnesia, or with the alkalies.—γ. The preparations of *juniper berries* also act directly upon the kidneys, by means of their essential oil. They are most appropriate in the sub-acute and asthenic cases, and are excellent adjuncts to other diuretics (F. 194.). The infusion (F. 235, 236.) is a suitable vehicle for various substances appertaining to this class (F. 397. 399.). RIVERIUS prescribed it with small doses of sulphuric acid; BANG, with cinchona; and PERCIVAL, with camphor.—δ. *Cajeput* oil, *oil of aniseed*, and others of the essential oils, possess diuretic properties, and may be used both internally and externally, as adjuvants of other substances belonging to this class of medicines, especially in the more asthenic states of the disease. The oil of aniseed is very serviceable in effusion connected with asthma, bronchitis, or lesions of the lungs, and with affections of the heart; and is a useful adjunct to colchicum, digitalis, camphor, &c.

77. (b) The *alkalies* and *their salts* are diuretic in small or moderate doses, and are appropriate to most cases of the disease. *Liquor potassæ* has been already noticed as serviceable in conjunction with other deobstruents and diuretics (§ 64.). It evidently neutralises the acid in the stomach, and is absorbed into the circulation. The *sub-carbonates* and *carbonates* of both potash and soda are more generally useful, especially in the complication with lesions of the liver, kidneys, and uterus, and when judiciously combined. They are also absorbed, and are decomposed by the acid (the muriatic, as shown by Dr. PROUT) of the stomach. But as the quantity of this acid which the stomach contains at any time is but small, the change can be effected only on a portion of the salt, if it be given in full doses. A similar change is most probably produced upon some of the vegetable acid salts in the stomach by the same agent, as Dr. PARIS has contended. The *citrates* or *tartrates* are useful and pleasant. They may be taken in bitter or diuretic infusions, whilst the fixed air is being disengaged by the action of the acid on the bicarbonates. The most certain, however, is the *cream of tartar*, in doses that act not energetically on the bowels. When prescribed in order to obtain its purgative effect



(§ 70.), it frequently also excites the kidneys; and, with borax, it is sufficiently soluble to be given in the form of draught or mixture, with diuretic infusions. It is also advantageously conjoined with the ferrum tartarizatum and other tonics in the asthenic states of the disease; and is most serviceable in ascites and anasarca. Formulæ 57. 397. 588. 590. 599. 628. are the best modes of exhibiting it as a diuretic. *Acetate of potassa* and *acetate of ammonia* may also be exhibited with tonic or bitter infusions (F. 196. 386.), and with either the decoction, spirit, or infusion of the various diuretics about to be noticed (F. 194. 358. 395. 400.). The *decoction* and the *extract of taraxacum* are excellent adjuvants of all the foregoing salts, as well as of the carbonates. They have been much praised by BONET, BANG, and J. P. FRANK, for their deobstruent and diuretic operation (F. 390—392.). *Nitrate of potash* has already been noticed among antiphlogistic remedies (§ 55.). It is readily absorbed into the circulation; and during its presence in the blood and elimination by the kidneys, it excites the capillary vessels, and stimulates these organs. It is indicated in all the acute states of the disease; and in these, after depletions, as well as in the atonic forms, it may be given in tonic infusions and decoctions, with diuretic tinctures or spirits (F. 399. 401. 406. 588. 591. 599.). All the *neutral salts*, particularly the *sulphates*, and the *super-sulphate of potash*, are absorbed, and excite the kidneys and extreme vessels, when taken in small doses, or much diluted. They are indicated chiefly in the acute or sub-acute varieties of dropsy, and in their complication with organic change in the liver. They admit of the same forms of exhibition as those more particularly mentioned, and are assisted in their operation by the same adjuncts.

78. (c) The action of the foregoing on the kidneys is well ascertained; but there are several other substances which are as energetic as they, but whose mode of operation is not so well understood. That the diuretics now about to be noticed excite the kidneys by means either of one or more of their constituent principles, seems very probable; but they also act in a similar manner upon the tissues to which they are immediately applied; and, when taken in small or moderate doses, so as to be absorbed into the circulation, they manifestly stimulate the capillary vessels, or impart more or less tone to them. Hence they are most beneficial in the atonic forms of the disease; or in the sthenic and plethoric states, after evacuations. Of this class of diuretics, *squill* is the most generally used. FRIZE, STOLL, and ZEVIANI, advise it to be prescribed with caution. It is commonly given with calomel and blue pill, in doses of a grain, gradually increased to five or six; or with the neutral salts, in the form of vinegar, tincture, or oxymel. CULLEN prescribed it with the oxymuriate of mercury; LANGHAUS, HOME, LANGE, and BROUGHTON, with nitre, rhubarb, cream of tartar, &c.; TISSOT, with camphor; WILlich, with tartar emetic; BERTRAND, with the *Æthiops mineral*; and KNEBEL and LEAKE, with opium. When it irritates the stomach or bowels, in conjunction with mercurials or saline substances, the addition of opium is requisite, if the propriety of continuing the

combination be still manifest; but, under such circumstances, it is seldom productive of benefit; and, in cases where vascular plethora or sthenic action is present, it is more injurious than beneficial. The preparations of it in the British Pharmacopœias are the best modes of exhibiting it; and these may be combined as directed in the Appendix (F. 196. 399. 533. 552. 627. 781. 893.). This substance is indicated principally in the atonic states of effusion, when the urine is high-coloured and scanty (BLACKALL), and it acts more energetically upon the extreme vessels than on the kidneys.

79. *Genista*, or *spartium scoparium*, the common broom, in the form of decoction, has been prescribed by most writers on dropsies (F. 95.); as well as the *sarsaparilla*, various species of the *smilax* evidently possessing diuretic properties. *Gratiola officinalis*, or *hedge hyssop*, in the form of inspissated juice or decoction, was recommended by DUVERNEY and STOERCK in dropsy consequent upon scarlatina, both as a purge and as a diuretic, in small doses. The *pyrola umbellata* has been employed by RUDOLPH and SOMERVILLE. The former combined it with tartar emetic and opium. Dr. SOMERVILLE, Dr. BEATTY, and Dr. BIGELOW have adduced strong evidence in favour of its diuretic operation. The decoction is the most active form of exhibiting it. It seems most efficacious in the hepatic complications of dropsy. In addition to these, the infusions of the *ballota lanata* and of the *b. suaveolens* have been prescribed by REHMANN; the decoction of the *petroselinum*, or parsley, by RICHTER; the inspissated juice of the *rhapbanus raphanistrum*, by GRULING and others; the expressed juice or infusion of *chærefolium*, or *musk chervil*, with nitre; the *chenopodium anthelminticum* and *c. ambrosioides*, by LENTIN; the *cichorium verrucarium* and *chondrilla juncea* (species of *succory*), by SPINDLER. Several species of *saponaria*, the *angelica archangelica*, the *levisticum*, or lovage, the *sium berula*, sassafras, sweet-fennel, asparagus, and various other plants, have been recommended by authors, in the form either of infusion, decoction, or of the expressed juice.

80. *Colchicum* was much used by STOERCK, BOEHMER, ERHMANN, DE MEZA, and OBERTEUFFER, as a diuretic. It possesses much of this property, when it does not irritate the stomach or bowels. HAUTESIERK justly considers it inferior to squills. In the acute states of dropsy, it is best given with mercurials in powder; but, in asthenic cases, it is most advantageously conjoined with the warmer diuretics, with tonic infusions, or with preparations containing camphor or ammonia (see F. 194. 395.), or with large doses of the alkaline sub-carbonates, particularly in the gouty or rheumatic diathesis. STOERCK combined it with the infusion of rhubarb; and OBERTEUFFER, with cream of tartar, juniper, and guaiacum. The diuretic action of *rhubarb* is deserving of notice. When given either in small doses, or in infusion as a vehicle for other substances of this nature,—as the saline diuretics and the preparations of squills, of juniper, or of colchicum,—it is a useful medicine in dropsies. It was employed in this way by WERLHOF, FORDYCE, BANG, and RUSH. The *diosma crenata* also acts upon the kidneys. Its infusion may be used in similar cases and states of



combination to those in which rhubarb is appropriate (see F. 231. 396.). The *marchantia hemispherica*, or liverwort, has been recently employed with much benefit by Dr. SHORTT, in cases where other remedies had been employed without advantage. He has, however, found but little service from its internal use, and has employed it chiefly externally as a poultice. For this purpose it is first boiled, afterwards beat into a pulp, and mixed with as much linseed meal as will bring it to the consistence of a poultice, which is spread upon flannel, and applied warm over the seat of the effusion, repeating the poultice every twelve hours, until the accumulation of water is removed. It produces "copious perspiration, and at the same time acts powerfully on the kidneys." The sinking sensation it sometimes occasions is relieved by the *spiritus ætheris nitrici*. The effects of this application are stated to be increased by allowing the patient warm and nourishing diluents, and beef tea, &c. Dr. SHORTT believes that this application will be found to succeed in many cases where the kidneys are affected. The bark of the root of *cichorea racemosa anquifolia* has been lately employed by M. LEMASSON. This bark furnishes a crystallisable principle, of a bitter and astringent taste, soluble in water and alcohol, in which the virtues of the plant reside. A decoction of two drachms of the bark in eight ounces of water is divided into two doses, which are taken with an interval of two hours. This generally affects the kidneys, and the action continues for some days. As soon as its action begins to diminish, the same doses are repeated. It is suitable only to the asthenic states of the disease.

81. *Cantharides* have been recommended in dropsies, on account of their diuretic action, by HIPPOCRATES, GALEN, DIOSCORIDES, and others among the ancients; and by BRISBANE, FARR, and several modern writers. HOFFMANN, WERLHOFF, and HUFELAND, gave them with cream of tartar; the tartaric acid, or nitrate of potash, and with camphor; and TULPIUS in the form of tincture with *spiritus ætheris nitrici*, cardamoms, &c. They should be exhibited with great caution, and only in the most asthenic forms of the disease. Dr. GROENEVELT, a licentiate of the college of physicians, was committed to Newgate in 1693, by the president and censors, on the plea of *mala praxis* for prescribing them in diseases of the urinary organs, although numerous authorities in support of the practice could have been adduced. *Cantharides* act upon the kidneys, and upon the capillary system, chiefly from the absorption of their active principle, which has been termed canthariden.

82. The *æthers* also act upon the kidneys, especially the *spiritus ætheris nitrici*, and *spiritus ætheris sulphurici*. They are useful chiefly as adjuvants of other diuretics. The sweet spirit of nitre is, however, an active diuretic when judiciously combined, or when given while the patient can take exercise in the open air (see F. 169. 195, 196. 397.). It may be remarked generally respecting the use of diuretics, that the addition of small doses of opium, or of the *tinctura opii comp.* (F. 728.) as advised by HUFELAND and PARIS; and of out-door exercise, as directed by TISSOT; will much augment their operation. Many of the Continental writers ad-

vise them to be taken in *malt liquors*—a vehicle which certainly promotes their action, and is not inappropriate in the asthenic forms of the disease. It is in these forms principally that Dr. RUSH conceived that any advantage was derived from this class of medicines; and DECKERS, FRIZE, MURSIGNA, and MAGENNIS, seem to have been of nearly the same opinion, they having recommended them to be given with tonics.

83. *D. Emetics* have been employed by several authors, particularly by SYDENHAM, LILLIE, J. P. FRANK, and PERCIVAL, chiefly after other medicines had failed; and some advantage has been said to have accrued from them. Squills are the emetic most commonly employed, which probably are partially absorbed, and act also as a diuretic. Several writers have mentioned instances of the disappearance of dropsy after spontaneous vomiting; and have looked upon this circumstance as an indication for exhibiting emetics. They are scarcely ever used in modern practice, and probably the cases are few in which they are indicated. I have seen, however, instances wherein obstinate vomiting supervened apparently upon the medicines which had been exhibited as diuretics, particularly digitalis, squills, and colchicum; but the good effect that appeared in these cases was attributable to the preceding course of medicine, and to the accumulated effects of these substances upon the system.

84. *E. Diaphoretics and sudorifics* have been recommended by most writers. But in the majority of cases, particularly in the acute and plethoric, there is great difficulty in producing perspiration; the means which are employed, unless they be of a contra-stimulant or relaxing nature, tending rather to excite the vascular system, and to increase the morbid exhalation, than to relax the surface, and produce diaphoresis. *Tartarised antimony*, *Dover's powder*, and *spiritus ætheris nitrici*, are, perhaps, the best sudorifics that can be employed; but the former should be given, in the acute cases, so as to occasion some degree of nausea; and the last named, in asthenic cases. *Dover's powder* was much confided in by MUDGE, and *guaiacum* by CHAMBERLAINE and BRÜCKMANN. As to the propriety of resorting to *warm bathing*, in order to induce perspiration, much difference of opinion has existed. Tepid baths were recommended by STOLL and FRANK, in the acute states of the disease, and *vapour baths* by DARBEY and others.

85. *F. Mineral waters*, if judiciously directed and brought in aid of medicine, are often productive of much benefit. ZACUTUS LUSITANUS recommends the internal use of *sea water*; and there can be no doubt that it will prove beneficial if persisted in, particularly in the sub-acute and atonic states of the disease. In the more asthenic forms of dropsy, the *Bath waters*, the mineral waters of *Carlsbad*, *Ems*, *Marienbad*, and *Vichy*, and those of *Seltzer*, are often serviceable. In cases depending chiefly upon obstruction, and where an aperient action is desired, the waters of *Harrogate*, *Moffat*, and *Leamington* \* may be tried.

\* Dr. LOUDON, of Leamington, favoured the author with the results of an extensive series of experiments made to ascertain the composition of these waters. There are eleven springs of mineral water, seven of which are purely saline, three sulphureous, and one chalybeate. The saline contains .098 cubic inches of oxygen, .763 of azote, 3.156 of carbonic acid, 34.435 grains of sulphate of S s



86. *G.* The combination of two or more of the plans now mentioned is often necessary. But this must depend entirely upon the nature of the case in respect of vital energy, and of visceral complication. Certain, however, of the above classes of measures are incompatible one with the other; as purgatives with diaphoretics, and cathartics with diuretics. But a moderate purgative action will often not materially prevent the operation of medicines on either the skin or kidneys; and some purgatives will even act sensibly upon both the bowels and urinary organs, particularly cream of tartar. Deobstruents, emetics, and external applications, often aid the operation of both diaphoretics and diuretics. Various substances, especially those of vegetable origin, are even more diuretic when applied in the form of poultice, or fomentation, or liniment, to the cutaneous surface, than when taken into the stomach, probably owing to the alteration or digestion they undergo in the alimentary canal, by which they partially lose their activity. Several of the older writers insisted much upon the external use of medicines in this disease, evidently from having witnessed instances of the success of the practice.

87. *Diet.*—In respect of diet, little need be added. It should entirely depend upon the form of the disease—be spare and cooling in the acute cases, and light and nourishing in the chronic or asthenic; and directed with reference to the visceral complication. The patient should not be restricted from drink. Under the head “*Potus*,” in the *Appendix*, will be found formulæ for several beverages, which may be reduced, modified, or rendered agreeable, as circumstances may require such changes. Weak Hollands or gin-punch, or cyder, perry, or soda water, may also be allowed, according to the habits of the patient. Spruce beer is, perhaps, the best.

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soda, 14·534 of chloride of sodium, 17·570 of chloride of calcium, and 26·050 grains of chloride of magnesium, in the Imperial pint. The sulphureous wells, besides these ingredients, contain 3·620 inches of sulphuretted hydrogen. The chalybeate differs in no way from the saline, but in containing 8·580 grains of bisilicate of iron. They are all, therefore, purgative waters. The dose is a pint daily or every other day; and a course of six weeks is generally directed. Small portions of iodine and brome, also, have been discovered by Professor DAUBENY in these waters.

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III. DROPSY OF THE ABDOMEN. — SYN. Ἀσκιτης (from ἀσκός, a leather bottle); Ascites, Auct. var; Hydrocælia, Hydrops Abdominis, Hydro-abdomen, Dropsy of the Peritoneal Cavity; Die Bauchwassersucht, Germ.; Ascite, Hydro-pisie Ascite, Fr.; Idropisia Ascite, Ital.

88. DEFIN. Heavy, tense, and fluctuating swelling of the whole abdomen, arising from a collection of watery fluid in the cavity of the peritoneum.

89. i. CAUSES, &c. (a) The great extent of the peritoneum, the number and importance of the

viscera with which it is connected, and of the absorbent glands it incloses, the numerous sources of disorder to which these organs are exposed, the great number and weakness of the veins which transmit their blood to the portal vessels, and the absence of valves from them, in some measure account for the frequent accumulation of fluid in this cavity. Ascites may arise from any of the causes enumerated above (§ 8, 9.), and at any age. CAMPER, LEE, and others, have seen it in new-born infants; but it is most common in women and aged persons. I have observed it in children at all ages. It occurs more frequently in married than in unmarried females and girls; and is often the consequence of the distention and pressure attending pregnancy, of difficult or instrumental labours, and of suppression of the puerperal secretions, or of the perspiration or catamenia, or of the disappearance of this last evacuation. It appears in both sexes from the usual causes of inflammatory diseases, and the morbid agents to which the abdominal organs are liable, particularly the ingestion of cold fluids when the body is perspiring, the use of spirituous liquors, cold, and moisture, and both, or moisture merely, conjoined with marsh effluvia, a poor, watery, or unwholesome diet, or errors in diet, the drastic operation of purgatives, external injuries of the abdomen, and the suppression of accustomed secretions and discharges.

90. (b) Pre-existent disease, particularly diarrhoea or dysentery, and sudden interruptions of these discharges; intestinal worms; organic lesions of the liver and spleen, especially obstructions of their venous circulation; inflammation of the vena porta, and obliteration of one or more of its principal branches; the suppression of chronic eruptions, or of the exanthemata, — as scarlet fever, erysipelas, &c. — or the premature disappearance of the cutaneous affection in this latter class of disorders; acute or sub-acute peritonitis; organic change of the structure of the kidneys; the rupture of cysts into the abdomen; uterine or ovarian disease (§ 35.); intermittent or remittent fevers; excessive evacuation and hæmorrhages; are all occasionally productive of effusion in this situation.

91. ii. PATHOLOGICAL STATES. — Ascites is, 1st, *In respect of its structural relations* — (a) idiopathic, or primary; (b) consecutive, or metastatic; and (c) symptomatic, or complicated; — 2d, *As regards the state of vital energy and vascular action*; (a) acute, or sthenic; (b) sub-acute; and (c) chronic, passive, or asthenic.

92. A. The idiopathic form constitutes but a small proportion of the number of cases of ascites met with in practice. LEPOIS and MORGAGNI have adduced several instances in which it appeared soon after drinking large quantities of cold water; and many more may be found in the works of other authors. — (a) The acute, or active, or even the inflammatory state, is that in which idiopathic ascites is most frequently observed. It usually occurs either in the young, the robust, or the well fed, and presents all the symptoms of the phlogistic diathesis: — the pulse is hard, thirst increased, the urine scanty; the skin is warm, hot, or coloured, and resists more or less the pressure of the finger. It commonly proceeds directly from the external agents men-



tioned above, or from the suppression of an accustomed discharge, or of some eruption; and often advances rapidly, with symptoms of inflammatory or excited action in the peritoneum, — with pain, tenderness, and sometimes tension of the abdomen; a quick, small, hard, or wiry pulse, and suppression or diminution of all the secretions and excretions. Either consecutively on, or concomitantly with, these symptoms, fullness of the abdomen is observed, which usually augments rapidly. At first the increase is most remarkable in the lower part of the abdomen and iliac regions when the patient is sitting up, and the liver is not enlarged; but it is always diffused when the patient is in the supine posture, and without any limitation or tumour. Upon examining the abdomen by percussion, a somewhat dull sound is emitted, and the examination occasions pain. The surface of this cavity is generally dry or harsh, warmer than natural, and more tender to the touch; and fluctuation is very easily perceived by placing one hand, or the index finger, upon the anterior part of either iliac region whilst the patient is erect or sitting up, and striking gently, at a little distance, with one of the fingers of the other hand. According to M. TARRAL, a slight effusion will be detected, and the nature of the disease made evident by this means, long before it reaches the height that can be recognised in the usual way. (See ABDOMEN, § 16.) As the accumulation augments, all the abdominal functions are more and more disturbed; and at last respiration becomes difficult, from the pressure of the water upon the liver and stomach, and the impeded descent of the diaphragm; and the patient is unable to lie down. The abdomen is now large and prominent in its upper regions, and pushes, particularly in young subjects, the ribs and cartilages upwards. Irritability of stomach, anxiety, restlessness, want of sleep, great quickness of pulse, sometimes delirium, and ultimately coma and death, supervene, if temporary or more prolonged relief be not obtained from treatment.

93. (b) The *sub-acute form* of ascites is milder in its character and slower in progress than the foregoing; and, as well as the acute, is not an infrequent sequela of scarlet fever, and more rarely of measles; but is, in such cases, always attended by more or less anasarca. When it thus occurs, it usually appears gradually, and commences from seven to fourteen days from the disappearance of the eruption, commonly with a recurrence of the febrile symptoms, quickness of pulse, dryness of skin, thirst; loaded, white, or furred tongue; and diminution or interruption of the secretions. All the phenomena increase more gradually, however, than in the acute; and are more readily controlled by treatment. In both these forms of ascites, the urine is scanty, often pale, and always contains more or less albumen. The face is generally oedematous in the morning, and the ancles in the evening. In other cases of the sub-acute variety, the effusion takes place upon the disappearance of some acute disease, either attended by free discharges, or treated by copious depletions; frequently with febrile symptoms, and always with interruption or diminution of the natural secretions, the fluid parts of the blood being discharged by the increased determination to the peritoneum. In

both the *acute* and *sub-acute idiopathic forms* of ascites, the accumulation of fluid arises from increased exhalation — *hypercrinea* of the peritoneum, according to the phraseology of M. ANDRAL — the result either of morbidly excited vascular action, or of increased determination of blood, conjoined with a relaxed or weakened state of the exhaling vessels and pores.

94. (c) The *asthenic, or passive*, state of idiopathic ascites is the most rare. It occurs chiefly after profuse hæmorrhages and evacuations; in chlorotic females, or shortly before puberty; in ill-fed persons, living in cold, low, or damp localities; and in those who are excluded from the solar light, or are under the influence of the depressing passions, and are employed in sedentary occupations. It usually commences with, or is preceded by, oedema of the ancles, feet, and legs. It proceeds very slowly; and is attended by general debility; cold extremities; a pale and sickly countenance; a cold or cool skin; a weak, small, quick, or fluttering pulse; pale or loaded tongue; diminished or vitiated appetite; various dyspeptic symptoms; and by chlorosis or hysteria in females, amongst whom this variety is most frequent. The urinary secretion is more copious, and the bowels more irregular, and more readily acted on by purgatives, in this than in the other forms. Whilst lowering measures benefit the two preceding, they aggravate this variety of the disease (see § 102.).

95. B. *Consecutive, or metastatic, ascites* occurs in either of the *acute* or *sub-acute* states described above; more frequently the latter (§ 93.), when there has been no suppression of the disease on which it is consequent: but, when any of the febrile exanthemata have been prematurely driven from the surface; or when the patient has been exposed to cold or moisture, or both, during convalescence; or if it have supervened upon erysipelas, rheumatism, or gout; the acute or sthenic condition is most common. It is much less acute, if it have supervened upon inflammation of some parenchymatous or adjoining organ; or if it accompany pregnancy. In other respects the characters and progress of the disease are the same as those stated in respect of the idiopathic varieties.

96. C. The *symptomatic, or complicated, states* of ascites are the most common; and, like the primary or idiopathic, present every grade of activity and acuteness. But whilst, in the latter, the acute and sub-acute are most frequent, in the symptomatic, the asthenic state predominates; although an irritative form of inflammation is sometimes observed to occur in the course of the disease, often, probably, owing to the irritating properties of the effused fluid, as shown above (§ 34.). Complicated ascites presents many of the organic lesions that occasion symptomatic dropsy (§ 12.); most commonly structural changes in the liver, or vena porta; in the spleen; in the mesentery and its glands; in the kidneys; in the uterine organs; and in the veins and lymphatics. The dropsical collection appears after a longer or shorter period of disease referrible to these organs; commences imperceptibly, and proceeds slowly; and generally without febrile symptoms until towards the fatal close of the disease. Frequently oedema begins in the feet, and extends upwards to the knees, thighs, scrotum, or hips,



and as high as the iliac regions and loins. But ascites often reaches its acmé without any anasarca or oedema. As the accumulation increases and rises up into the epigastric region, the symptoms become more urgent,—the respiration more quick, short, and difficult; the pulse more rapid; the functions of the stomach more disordered; the alvine evacuations longer retained; the urine more scanty, higher coloured, and more turbid—often brown and foetid; the skin drier; and the face, and other parts which are not oedematous, more emaciated. In this form of the disease, the veins of the abdominal parietes often enlarge and become very apparent; a symptom which M. REYNEAUD found dependent, in several cases, upon obstruction or obliteration of the vena porta; the sub-cutaneous veins of the abdomen having been enormously dilated. When the effusion arises from disease of the substance of the liver, it is not infrequently associated with some degree of jaundice. With great distention of the abdomen, distressing borborygmi occur, and aggravate the symptoms. The anxiety debility, restlessness, and inability to sleep increase; and in some instances, hydrothorax or anasarca, or both, either with or without a diminution of the abdominal accumulation, supervene in this stage of the malady. The fatal close of the disease is generally ushered in by somnolence, or by delirium followed by somnolency; by urgent thirst and dryness of the mouth and throat; by vomitings or retchings; by leipothymia; small, frequent, and irregular or fluttering pulse. The duration of this form of ascites is extremely various: it may continue for years, or it may run its course in a few days. In this latter case, either the kidneys are very seriously diseased, or the circulation through the vena porta is obstructed. The complication of ascites with *pregnancy* will be considered in the sequel.

97. iii. APPEARANCES IN FATAL CASES.—(a) The *effused* fluid varies greatly in quantity and appearances. It is usually of a pale citron or yellowish tint; sometimes greenish, or even brown. When it has arisen from obstruction in some adjoining viscus, as in the passive states, it is generally limpid and nearly transparent; but when it has proceeded from disease of the peritoneum, as in the acute forms, or from sub-acute inflammation, it is turbid, whey-like, contains albuminous flocculi, or pieces of filamentous lymph, or even thin or partial adhesions. In some cases the fluid exhales a foetid or urinous odour, and it is occasionally of a brown, or nearly blackish hue, from the exhalation of some of the colouring particles of the blood.—(b) The *peritoneum* presents, in different cases, all the changes already described (§ 10.). Sometimes it is covered by a thin albuminous or muco-albuminous coating, or is adherent in parts. In other cases it is softened, thickened, blanched, and as if macerated; and in some granulated, or tuberculated (BICHAT, BARRON, ANDRAL). The *omentum* has occasionally nearly disappeared (MORGAGNI, PEZOLD, DE HAEN, &c.); or it is pushed up towards the stomach (OSIANDER, myself, and others); or adherent in parts to the intestines, or to the abdominal parietes (RIBE, ANDRAL, &c.); or suppurated, thickened, and indurated (STOËRCK, OSIANDER, &c.). It has likewise contained steatomatous or other tumours. The *mesentery* is sometimes also diseased.

Its glands are very frequently enlarged; and tumours of various kinds have been found in it by TULPIUS, HARDER, J. P. FRANK, VON BERGER, ALIX, ANDRAL, myself, and others. The *pancreas* has been seen enlarged and scirrhus, but it is not often altered in structure. The *liver* is most generally diseased. The vena porta has been found obstructed by coagulable lymph, the product of inflammatory action, and even altogether obliterated, by REYNEAUD; or pressed upon by tumours, or its circulation impeded or interrupted by atrophy, or by enlargement, or by induration of the substance of the organ; or by scirrhus, granular, or tubercular degenerations of its structure (see LIVER). The *gall-bladder* and hepatic ducts have been found containing biliary concretions, by MORGAGNI, HOFFMANN, STOËRCK, MARTEAU, and others; and in some instances distended by a black and thick bile; or containing a small quantity of pale mucous bile, by the same authors, as well as by RIDLEY, PEZOLD, DUVERNEY, YONGE, and several recent writers. The *kidneys* have also been often seen diseased as described above (§ 13.); and the *spleen* is very frequently enlarged, indurated, and otherwise changed (SELLE, SCHMUCKER, HORN, GROTANELLI, and myself), as described in that article, especially in the abdominal dropsies that occur in low, moist, warm, and miasmatic localities.

98. iv. DIAGNOSIS.—A. Ascites may be mistaken for tympanites, for the various kinds of encysted dropsy, and for pregnancy.—(a) *Tympanites* is readily recognised by the clear resonance furnished on percussion; by the absence of fluctuation, and of oedema of the lower extremities; and by the history of the case.—(b) *Ovarian dropsy* is generally preceded by pain, tenderness, and tumefaction, or distinct tumour in the regions of the ovaria; and the enlargement proceeds from one or both these parts. It is never general or uniform in its earlier stages, as in ascites; and fluctuation is usually very obscure, and to be detected only in the situation of the tumours, the circumscribed form of which may be determined until a very advanced period of the disease. Instances, however, occur, in which the ovarian tumour induces effusion into the peritoneal cavity: in this case, the exact nature of the disease can be ascertained only from a knowledge of the phenomena attending its early stages, or of those consequent upon tapping; the letting out of the ascitic fluid generally allowing the ovarian disease to be readily detected. The same remarks apply to dropsy of the *Fallopian tubes*, which are attended with nearly the same phenomena as the ovarian disease.—(c) In *hydrometra*, or *dropsy of the uterus*, fluctuation is with difficulty ascertained; and cannot be detected in the iliac regions, by the means described above (§ 92.); besides, the form of the uterus may be defined upon a careful examination; the progress of the affection is usually much slower than in ascites, and there is much less disturbance of the general health. There are, moreover, entire obstruction of the catamenia, and a sense of heavy pressure on the rectum, bladder, and adjoining parts.—(d) *Cysts* containing a watery fluid, and of great size, are sometimes attached to the liver or to the spleen, giving rise to appearances in their advanced states closely resembling ascites. But they always present a circumscribed tumour upon ac-



curate examination, the swelling commencing on one side, generally in the upper regions of the abdomen, whilst ascites begins, when the patient is up, in the lower, and is equally diffused when he is supine. — Of *encysted dropsies*, generally, it may be remarked, that a heavy weight, sometimes with dragging pain, is commonly felt when the patient turns in bed, particularly to the opposite side to that to which the cyst is attached; and that he usually lies on the latter side. When only one large cyst, containing a watery fluid, exists, the diagnosis is sometimes very difficult, unless the history of the case is known, particularly in respect of the last stages of some kinds of ovarian dropsy. In rare instances, several cysts are attached to different parts of the same viscus, or even to different organs, or to the abdominal parietes. But very much more frequently the dropsical ovarium, or ovaria, is very irregular and lobular, owing to its division into several distinct cysts. In all such cases, the abdomen, upon an accurate manual examination, will feel more or less irregular and unequal, and the nature of the disease be nearly manifest. M. Piorry states that a duller sound is emitted upon percussion in encysted dropsies than in ascites; and that the parts around the cysts furnish the same sound as in health. The progress also of encysted dropsies is always slow, and their duration frequently very long. They are commonly unattended by much constitutional disturbance until they reach a very great height, so as to press injuriously upon the stomach, and to impede the functions of respiration, when hectic fever is often developed: the secretions and excretions, and even the quantity of the urine, not being much diminished or disordered until then (see Dropsy — *Encysted*). — (e) *Pregnancy* is distinguished from ascites by the state of the *os uteri* upon examination, by the progress of the enlargement, and the defined form of the uterus, when the patient is supine, and the abdominal muscles relaxed; by her unbroken health and clear complexion, — the countenance of dropsical persons being pale, sickly, and cachectic; by the enlargement and firmness of the breasts, and the deep colour of the areolæ, — these organs being soft and flaccid in ascites. (See PREGNANCY.)

99. B. It is not enough that we should satisfy ourselves as to the exact situation of the effused fluid, but we should *determine as correctly as possible the pathological condition giving origin to it*. In order to do this, we should endeavour to connect it with its exciting causes, and to enquire into the external agencies concerned in its appearance, and the conditions of the various secreting and excreting organs. The manner of its accession, the rapidity of its early progress, the sensations of the patient previously to this event, and the several phenomena furnished by an accurate manual examination, as well as a rational consideration of all the natural functions, in connection with external signs, must be our main guides in coming to a conclusion relative to the alteration or alterations, functional and organic, upon which it chiefly depends. The rapid increase of the swelling after exposure to cold or any of the usual causes of inflammatory disorder, or after the suppression of discharges or of eruptions; a sense of tension or pain in any of its regions; increased sensibility upon examination

by percussion, or in any other way, especially in the hypochondria, in the loins and uterine region, demand particular attention; and the urine should be daily examined, and its coagulability noted. The size of the abdomen should also be observed daily, and the decrease and increase marked by a tape measure.

100. v. PROGNOSIS. — The prognosis in ascites must necessarily depend upon its form and complications, upon the habit of body, and constitutional powers of the patient, and the effects of remedies. A much more favourable opinion of the result may be formed when the disease is primary, occurs in young and previously healthy persons, or follows scarlet fever or measles, than when it proceeds from organic change either in the liver, kidneys, ovaria, or other abdominal viscera. In cases of this latter description, very few recover permanently. Swelling of the hands; emaciation of the arms; frequent cough; very scanty foetid and thick urine; colicky pains; the presence of jaundice; and the occurrence of hiccup, vomitings or diarrhœa; are very dangerous symptoms. The appearance of aphthæ, of convulsions, of livid blotches on the extremities, particularly on the hands and forearms, are commonly fatal signs, as justly insisted on by HIPPOCRATES, FORESTUS, FRANK, and others. Somnolency, great irritability of stomach, a pulse above 120 or intermittent and small, and delirium, are not less unfavourable (see § 37.). The characters of the fluid let out by tapping also indicate the result. If it be thick, foetid, brown, glutinous, or albuminous, no permanent advantage will be derived from the operation.

101. vi. TREATMENT. — But little in addition to what I have already stated may be said of the treatment of ascites. — A. Its *acute or sub-acute idiopathic states* require vascular depletions, general or local, or both, and the rest of the antiphlogistic regimen, to an extent which the pulse and symptoms, and circumstances of the case, will indicate. In ascites occurring in *children* after the exanthemata, local depletions will be sufficient, but if leeches be applied, their punctures should be carefully watched; for there is often great difficulty in arresting the hæmorrhage from them after these diseases. Mercurials and antimonials, at first so as to act upon the bowels, and subsequently as alteratives, or with opium, and pushed as far as to affect the mouth; external irritants and derivatives; deobstruent diuretics, and digitalis — this last particularly in the ascites consequent on scarlet fever; diaphoretics and warm or vapour baths, followed by oleaginous frictions of the skin, in order to restore its perspiratory functions; and, lastly, gentle tonics conjoined with purgatives, or with diuretics, and assisted by warm iodine or medicated baths, will frequently succeed in removing disorder, if early employed, and if a vital organ have not experienced serious structural change. Upon the whole, these forms of ascites should be treated as described at length in a preceding chapter (§ 40.).

102. B. The *asthenic form* of primary ascites (§ 94.) is most readily removed by the tincture, or other preparations, of iodine; by the ferrum tartarizatum with cream of tartar; by the combination of purgatives with tonics, as BACHER's pills; or of tonics with diuretics; by warm salt-water bathing; warm medicated baths, particularly



those with iodine or aromatic herbs; and frictions of the surface with stimulating liniments. The gentler vegetable tonics should be first employed, and subsequently chalybeates and the more active tonics, as bark, gentian, &c.; and these may be conjoined with acids, particularly the sulphuric with spiritus ætheris sulphurici, or the nitromuriatic with spiritus ætheris nitrici, and other diuretics; and alternated or associated with the rest of the treatment recommended above (§ 42.). In this, and other forms of asthenic ascites, J. P. FRANK advises the exhibition of full doses of opium,—a practice from which I have seen much benefit obtained after morbid secretions had been evacuated by purgatives as now prescribed. I have, however, usually combined the opium with diuretics and tonics. Dr. GRAVES, whilst he adopts this part of FRANK's practice, recommends, in addition, the free use of animal food, which is doubtless requisite in many instances, particularly when the effusion has arisen chiefly from a poor or thin diet, and other depressing causes.

103. C. The *metastatic form* of ascites requires a similar treatment to that directed for the acute and sub-acute states (§ 40, 41.), together with means to restore the primary affection. Counter-irritation of an active kind, and long persisted in, as well as appropriate to the nature of the disease on which it has supervened, will often prove beneficial. The repeated application of moxas has been for ages commonly resorted to in ascites in the eastern countries of Asia, and has more recently been found useful by some Continental physicians. Several moxas are usually directed to be placed around the umbilicus, or over the hypochondria, or upon the loins, according as the functions of the liver or kidneys appear to be most obstructed. Sulphureous, vapour, iodine, and other medicated baths, seem calculated to prove beneficial in this, more than any other form of the disease. In this variety, also, the oxyurias hydrargyri may be taken in the compound decoction of sarsaparilla, with colchicum or squills; or the ioduret of mercury may be cautiously exhibited, in small doses, with digitalis and extract of conium. When the disease has followed the suppression of the catamenia, the preparations of iodine\*, much diluted, or the

supertartrate of potash, with an equal quantity of borax, and sulphur, have succeeded in restoring the suppressed evacuation, as well as in removing the disease.

104. D. The *symptomatic, or complicated, form* of ascites must be treated according to the principles laid down (§ 44. *et seq.*), and with strict reference to the original lesion or malady, as far as that can be ascertained. The remedies, perhaps, the most to be depended upon, are *purgatives, alteratives, and diuretics*;—calomel, elaterium, croton oil, camboge, jalap, &c., variously combined; the nitro-muriatic acids, internally with the compound decoction of sarsaparilla, and externally in the form of bath or lotion; saline substances, with taraxacum; the preparations of iodine in small but frequent doses, much diluted, long persisted in, and associated with narcotics, particularly opium, or lactucarium, or conium; cream of tartar or acetate of potash, variously combined, especially with squills; and, subsequently, the decoction of broom tops (F. 75.), or of pine tops (F. 51.), or the decoctum cydoniæ compositum (F. 57.) or the decoct. inulæ comp. (F. 67.), or the infusum berberis (F. 225.), with one or more diuretic medicines. *Cream of tartar* was found most successful by Dr. HOME; and, if given in sufficiently large doses, conjoined with substances suitable to the complications of the case, and continued sufficiently long, is the most certain remedy that can be prescribed. I have usually exhibited it, in this state of the disease, in doses of from two drachms to half an ounce, in the form of electuary, with an aromatic powder and diuretic medicine. In this form it generally acts freely on the bowels, and sometimes, also, increases the flow of urine. Terebinthinate injections, and oleaginous frictions, as already directed (§ 65.), are also useful adjuvants. In some states of ascites, advantage may be derived from the internal exhibition of *cantharides*. J. P. FRANK has seen cases where it has effected a cure; yet he considers it the most uncertain medicine that can be prescribed. *Graduated compression* of the abdomen, by means of the belt recommended for ascites by the first MUNRO, has been employed successfully by Professor SPERANZA and M. GODELLE; and, when it can be borne, may prove serviceable in some asthenic and chronic states of the disease. RIVERIUS recommends poultices of the bruised *charlock*, the *raphanus raphanistrum*, to be placed over the loins or upon the abdomen, and to be frequently renewed. Bran poultices are also in common use. The warm *medicated baths*, already noticed, are calculated to be of service, when assisted by *sudorifics*. But these last cannot be depended upon unless they be combined with opium. Hence the occasional good effects of DOVER's powder. In some cases, an increased proportion of the ipecacuanha will be useful. I have seen benefit derived from the following, when the stomach was

\* I was consulted, some years ago, respecting a case of ascites consequent upon profuse and frequent menstruation. This discharge had been suppressed by exposure to cold; and, soon afterwards, symptoms of inflammation of the serous covering of the liver, with effusion, were observed. These were combated by local depletions, which were repeated; by external irritants, by mercurials, and, subsequently, by cream of tartar with borax and diuretics, and other means in various forms of combination; but without any permanent benefit. I directed at last a weak solution of the hydriodate of potash with iodine; and caused it to be persisted in for seven or eight weeks, when good effects began to appear. This medicine was continued for five or six months; at the end of which time the catamenia had become regular, and the effusion had entirely disappeared. I was more recently consulted as to a similar case, in the care of Mr. GRABHAM, of Rochford; which had, likewise, been preceded by profuse catamenia, suppression of this discharge followed by pulmonary disease, and extension of tenderness and fullness from the thorax, over the region of the liver and abdomen; with effusion of fluid into the abdominal cavity. The pulmonary affection and the more acute symptoms subsided under the very judicious practice of this gentleman; but the means successively adopted in consultation failed of removing the dropsical collection, and of arresting the progressive emaciation. There was also, in this case, scrofulous disease of one or two of the metacarpal bones of the left hand. This was left to itself, in hopes

that the discharge from it would have had a salutary effect on the principal seat of disease. In summer, 1832, this young lady came to London, where various remedies were prescribed, without relief. I then put her upon a course of iodine; and, directing her to persist in its use, advised her return to the country. I have since understood that, during the use of this medicine, the effusion disappeared, and the catamenia returned; that she recovered her looks, and is now married.



not irritable, or when its contingent effect of causing vomiting would not be injurious.

No. 185. R. Pulv. Ipecacuanhæ gr. ij. ad iij. ; Camphoræ Subactæ gr. j. ; Pulv. Opii Puri gr. j. ; Potassæ Nitratis et Pulv. Radic. Glycyrrh. aa gr. x. M. Fiat Pulvis quovis in vehiculo idoneo sumendus ; vel sit bolus cum Conserv. Ros., et bis terve in die capiendus.

105. *Paracentesis* is the last means to which recourse should be had. I took occasion, many years ago, in the *London Medical Repository*, to differ from those who advise either an early or an indiscriminate recourse to this operation, and for reasons about to be stated. It has, however, had many advocates, from the earliest period of the art, and probably originated in the benefit, in some cases, derived from the spontaneous rupture of the umbilicus and discharge of the fluid. The empirical manner in which it was resorted to during the fifteenth and sixteenth centuries had brought it into disrepute, when MEAD, DELIUS, BANYER, STOËRCK, SCHMUCKER, and some others, wrote in favour of it, and endeavoured to establish it on a more rational basis. HAUTESIERK expressed himself favourably of it, and advised purgatives and tonics to be perseveringly prescribed after its performance. FOTHERGILL conceived that its want of success arose from its being too long delayed, and directed it to be resorted to early. In the present day it is certainly more frequently performed than circumstances appear to me to warrant ; and although it should not be proscribed from practice, I believe that the cases are few that will be benefited, and still fewer that will be cured, by it. The chief objections to it are founded on its being inappropriate in a large number of cases, on its liability to induce inflammatory irritation in the peritoneum, and on the facility with which air may enter the abdominal cavity during the usual mode of performing it. On these topics I will add a few words.

106. 1st. *Paracentesis* seems calculated to increase the mischief, and to diminish the chances of a complete cure, in acute and idiopathic ascites, either by increasing inflammatory irritation, where this already exists, or risking its supervention in the asthenic forms of the malady. When ascites depends upon altered structure of the kidneys, it will seldom do more than give temporary relief ; and a similar remark applies to the complication with disease of the liver. This advantage is, however, worth procuring, and is sometimes considerable, especially when a more decided effect is produced by medicines, as is sometimes the case, after the abdominal distention has been removed by it. But unfortunately this result is not always obtained ; for inflammatory irritation often extends from the punctured part, owing to the readiness with which an asthenic or erysipelatous form of inflammation follows punctures of serous surfaces, in a cachectic habit of body, and particularly when the functions of either the liver or the kidneys are obstructed ; and thus, in addition to the original structural lesions, disease is superinduced in the peritoneum, and the effusion is renewed with greatly increased rapidity. This complication is, moreover, favoured by the effects of the fluid upon the wound in the peritoneum ; for, as I have already shown, this fluid, owing to interruption of the depurating functions, is often possessed of properties which induce inflammatory irritation in the healthy peritoneum, and which are more likely to have a similar effect

when this membrane is punctured or otherwise divided.

107. 2d. The introduction of air into the abdominal cavity, although frequently unattended by any inconvenience in a healthy state of the frame, and particularly when the peritoneum and adjoining viscera are not in a morbid or irritable condition, is certainly sometimes productive of very serious and even fatal effects, especially in that state of the constitution and of the abdominal organs, in which ascites commonly presents itself. I believe that this inference is conformable to the experience of the most enlightened pathologists. The instrument, also, with which paracentesis is usually performed, although calculated to facilitate the removal of the fluid, favours the introduction of air. The wound it inflicts is such as to prevent the immediate closure of the aperture in the peritoneum ; and in some instances this membrane is pushed before its point so far as to detach it to some extent from the abdominal parietes,—circumstances which, when viewed in connection with the cachectic habit of body, weak powers of restoration, and morbid state of the accumulated fluid, are certainly favourable to the occurrence of asthenic inflammatory action, and its consequent effusion, after the operation. On this account, therefore, paracentesis may be preferably performed by the lancet, as recommended by J. P. FRANK ; or, after the abdominal parietes are divided by the scalpel, the lancet may be pushed through the peritoneum, a bandage placed around the abdomen being tightened as the fluid passes off, and care being taken to close the aperture with accuracy as soon as the stream begins to cease. But even in this manner the operation is not likely to prove of much service, where there is tenderness of the abdomen. Many of the cases of recovery imputed to paracentesis, I am convinced would have taken place without it, under an appropriate treatment ; whilst, doubtless, benefit has been derived from it, both of a temporary and permanent kind. Instances certainly sometimes present themselves, in which the symptoms are so urgent that it would be culpable to neglect having recourse to it. It should, however, be the last resource. In ascites appearing during pregnancy, it, or puncturing the foetal membranes, is both requisite and successful ; although in two such cases, in which I was consulted, the means hereafter to be noticed prevented the necessity of performing either. It is unnecessary to state the number of times the operation has been performed, and the quantity of water removed either at once or altogether. Extreme instances are comparatively rare, and convey no useful information. On this subject I will only add further, that tapping through the umbilicus has been recommended by Dr. SIMS, and several other writers ; that it has also been advised to perform the operation through the vagina ; and through the bladder, by Dr. BUCHANNAN. The objections to the second and third of these are very obvious ; and, as respects the last, the risk of urine escaping into the peritoneum must put it out of the question. The recommendation of conveying astringent fluids, or vapours, into the cavity of the abdomen, advocated by a few writers, both British and Continental, about the end of the seventeenth and beginning of the



eighteenth centuries, merely shows that medical and surgical temerity is not a result of science, but of its earliest dawn.

108. The *diet* and *regimen* in ascites is the same as that briefly noticed above. In the more asthenic states, a liberal diet of animal food of a light and nutritious kind is requisite, in addition to a tonic treatment; and much benefit will sometimes accrue from allowing the patient the use of malt liquor, or gin-punch, in moderate quantity, and from making either of them the vehicles for the exhibition of diuretics, with gentle tonics, or adding them to some one of the diuretic drinks in the Appendix (F. 588. *et seq.*). In cases of this description, Recipe 781., or the following, recommended by RICHTER, may likewise be used:—

No. 186. R. Rad. Scillæ Recent. ʒj.; Cort. Aurantii, Radicis Calami Arom., āā ʒij.; Juniper. Baccar. contus. ʒij.; Vini Albi Hispan. lb. iv. Digere per dies tres, cola, et adde Oxy-mel. Scillæ ʒij. M.

109. IV. PUERPERAL ASCITES.—i. PATHOLOGY.—The more frequent occurrence of ascites in the female sex has been partly attributed to the influence of the female organs in giving rise to it (§ 35. 89.), independently of the puerperal states. But effusion into the peritoneum may occur either (a) during pregnancy, or (b) after delivery.—A. *The association of ascites with pregnancy* has been noticed by several of the older writers, and by many of the moderns, and is not an infrequent occurrence. Either impregnation may take place during the dropsical disease, which is very rarely the case; or the effusion may be excited by pregnancy, being favoured by pre-existing obstruction in the liver, or a plethoric state of the system. This latter is the common mode of its appearance. It is generally of a sthenic or plethoric character, and is often associated with impeded circulation through the liver, or the right side of the heart; although it may be occasioned solely by changes induced by utero-gestation, and independently of visceral disease. In this latter case, the ascites seldom commences until about the third month. When it exists, the form or even the body of the uterus often cannot be ascertained by a careful examination of the abdomen, unless with difficulty, when the patient is quite supine, with the hips elevated. The hypochondria become enormously distended and elevated as the effusion and pregnancy proceed. The urine is lateritious, scanty, and of a high colour; and there is much thirst, and pains in the back, loins, and thighs. SCARPA states, that fluctuation is obscure in the hypogastric region and flanks, but distinct in the hypochondria, particularly in the left. The state of the os uteri, the patient's sensations, and the history of the case, will generally enable the practitioner to decide as to the nature of the complication and the period of pregnancy. This state of disease becomes remarkably distressing. The patient is afflicted by dyspnoea; and by cramps, pains, and œdematous swellings of the lower limbs, from pressure on the nerves and vessels supplying them, and by sickness and vomitings. She is unable to ascend the stairs, or to lie down in bed. The bowels are very constipated, and the breathing short and difficult; to these often are superadded great anxiety, lividity of the lips and countenance, heavy and somnolent headach, leipothymia, palpitations, and other symptoms indicating

the propriety of having immediate recourse either to paracentesis, or to the rupturing of the membranes. When the disease is dependent upon obstruction or structural lesion of the substance of the liver, a *fatal issue* often takes place soon after delivery, whether that have been premature or at the full time. But when it is occasioned chiefly by the changes in the nervous and vascular systems, and state of the circulation connected with pregnancy, a favourable termination may be expected. SCARPA, DESORMEAUX, and LEE, record cases, in which this disease was still further complicated with dropsy of the amnion (§ 115.).

110. B. Ascites more frequently occurs *subsequently to delivery*, but at no definite time; either in a very few days, or not until some weeks, or even months, afterwards. It may either be a sequela of the adynamic form of puerperal fever, of which I have observed two cases; or of peritonitis; or of inflammation of the uterus, ovaria, or of their veins, occurring at this period. It may likewise be induced by suppression of the lochia; or by a diarrhœa which has been suddenly arrested before disordered secretions and accumulated fæces have been evacuated; or which has been long neglected, or injudiciously treated. It is generally acute or sub-acute, when it appears in this manner; but if it occur in females who have been ill-fed, or who have experienced large losses of blood about the period of labour, it possesses very different features.

111. ii. TREATMENT.—(a) Ascites associated with pregnancy is seldom benefited by diuretics. In two cases which came under my care, and presented the symptoms described above, early, repeated, and moderate venæsection; a gentle and constant action upon the bowels by cream of tartar and confection of senna; and full doses of opium, assisted by various other means directed according to the symptoms; carried both patients to about the full period of gestation; and both bore living children. After delivery, the rapidity with which the water passed off by the kidneys was surprising. In one of the cases, three large chamber utensils were filled in twenty-four hours. Paracentesis was urged by the ordinary medical attendant in one of these, but was delayed as a last resource: it was not performed in either. Utero-gestation very seldom reaches the full time, when fluid is effused into the abdomen, whether the operation be resorted to or not. SCARPA advises its early performance, and adduces a case in which this complication was aggravated by dropsy of the amnion, and in which it was performed under the left false ribs, and the patient recovered. It was also resorted to successfully in the one recorded by Mr. LANGSTAFF. In M. DESORMEAUX's case there were ascites, dropsy of the amnion, and anasarca. He punctured the membranes, and brought on labour. The instance adduced by Dr. R. LEE resembled that mentioned by SCARPA. The *cervix uteri* being obliterated as in the ninth month of pregnancy, he ruptured the membranes, and brought on labour; after this the patient slowly recovered.

112. (b) As to the treatment of *ascites occurring soon after delivery*, the same means, appropriately to the circumstances of the case, as have been already described, are to be put in



practice. The great majority of such cases will recover under judicious management, if the liver or uterine organs be not very seriously diseased. Paracentesis is very seldom required; and I believe the risk of performing it to be greater in this state of the disease, than in any other, from its liability to induce asthenic inflammatory action in the peritoneum, and to increase it if it be already present. I may add, that instances have occurred in which air has been extricated from the decomposition of the animal matter in the fluid effused, particularly when the disease has depended upon atonic inflammatory action in this membrane, and thus the ascites has become complicated with true tympanitis. This is more likely to occur, after paracentesis has been employed in a case of this description. (See *Author*, in *Lond. Med. Repos.* vol. xvii. p. 378.)

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**V. DROPSY OF THE AMNION.**—*Hydrops Amniosis*,

*Mercier*; *Hydrops Amnii*; *Hydrometra of Pregnant Women*, Desormeaux.

113. **DEFIN.** *The preternatural distention of the uterus, by an excessive secretion of liquor amnii, giving rise to symptoms of ascites, sometimes with obscure fluctuation.*

114. i. **PATHOLOGY.**—A morbidly increased secretion may take place, 1st, within the amnion; and, 2d, between the membranes and uterus. The former usually occurs during advanced utero-gestation; the latter in the early months, and generally passes off without occasioning any disturbance as pregnancy proceeds. The excessive accumulation of fluid in the cavity of the amnion was first accurately described by M. *Mercier*; and it was imputed by him to inflammatory action in this membrane. It has more recently been noticed by MM. *Maunoir*, *Duclos*, and *Desormeaux*; but the researches of this last physician have not confirmed this view of its origin. Dr. R. *Lee* has recorded five cases, in none of which were any inflammatory appearances in the amnion, and only in two were there inflammatory or dropsical symptoms in the mother. But in all of them, some malformation or diseased condition of the involucre, or of the foetus, existed, and rendered it incapable of supporting life subsequently to birth. It is sometimes connected with a dropsical diathesis in the mother; but is more frequently entirely dependent upon disease of the foetus and its envelopes. It possibly may also depend upon an affection of the uterus itself, as hinted by M. *Desormeaux*.

115. **The Diagnosis of dropsy of the amnion** in its simple form, and where the quantity of fluid is not very great, is difficult. Fluctuation is obscure, deep seated, or wholly imperceptible. On examination, however, *per vaginam*, the body of the uterus is prematurely enlarged; the cervix is almost entirely obliterated; and there is a sense of fluctuation in the vagina upon percussion of the abdomen. The rapid increase of the uterus, the gravative pain in its region, the feeling of weight and pressure in the pelvis, the frequent calls to evacuate the bladder, and scanty secretion of urine, will further guide the practitioner. The diagnosis, however, will be rendered more difficult if it be complicated with ascites, as in the instances recorded by *Scarpa*, *Desormeaux*, and Dr. *Lee*. In this case there will be fluctuation on percussion, but this will be no sure information as to the situation of the effusion. The progress of the enlargement of the uterus, and the result of vaginal examination, in connection with an attentive manual investigation of the abdomen, alone can furnish correct indications as to the nature of the disease.

116. ii. **TREATMENT.**—The chief intentions are to relieve urgent symptoms, and to carry the patient safely, if possible, on to the period of delivery (*Desormeaux* and *Lee*). These objects may be attained by the treatment I have already advised (§ 111.), when the constitutional powers will admit of it. But if the symptoms become urgent, and the functions of the stomach entirely overturned, the advice of *Desormeaux* to puncture the membranes and induce delivery should be followed; when the disease will be remedied, if not complicated with ascites; in which case, the means already described must be practised.



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# VI. DROPSY OF THE CELLULAR TISSUE.—SYN.

*Anasarca* (from ἀνα, through; and σαρξ, the flesh), ὕπασάρκα, Auct. Vet.; Ἀνασάρκα, Liosius; *Leucophlegmatia*, of Carthuser, and several of the older writers; *Hydrosarca*, *Hydrops Anasarca*, Auct.; *Hydrops Cellularis*, M. Good; *Die Hautwassersucht*, *Zellgewebe-wassersucht*, *Die Wassersucht des Zellegewebe*, Germ.; *Anasarque*, Fr.; *Anassarca*, Ital.

117. DEFIN. *Diffused swelling, pitting beneath the pressure of the fingers, arising from an unnatural accumulation of serous fluid in the cellular tissue.*

118. *Dropsy of the cellular tissue* occurs in various forms and states: 1st. In respect of its form, it may be—(a) *partial* (*Edema*); or (b) more or less *general*, affecting either the tegumental cellular tissue chiefly (*Anasarca*), or the whole cellular substance (*Leucophlegmatia*). 2d. As to its state, it may be the result of increased action, or of obstructed circulation, or of vascular oppletion (see CELLULAR TISSUE, § 6.) I shall, therefore, treat of dropsy of the cellular structure, *first*, in its partial, and *secondly*, in its general, forms; and with strict reference to the states of vascular action and vital powers.

119. i. PARTIAL CELLULAR DROPSY.—*Edema* (οἰδῆμα, from οἰδέω, I swell). *A. Limited infiltration of the cellular tissue* is characterized by more or less swelling, which retains the impression of the finger for a short time. It is very common both as a symptom of general debility, or of disease of some adjoining or remote part, or in connection with the dropsical diathesis, of which it may be the earliest manifestation. It often accompanies inflammatory action of the other structures—as the mucous, the fibrous, &c. the contiguous cellular tissue being then infiltrated with serum, owing to its participation in the excited vascular action. Bronchitis, pneumonia, oedema glottidis, rheumatic or gouty affections, are illustrations of this occurrence. In cases of phlegmonous or sthenic inflammation of any part, especially of the cellular tissue itself, or of parenchymatous organs, the parts surrounding its seat are also often oedematous from the same cause. It may also arise from obstructed natural evacuations, as suppressed catamenia, the disappearance of this discharge at the decline of life, constipated bowels, imperfect action of the kidneys, &c. and, in such circumstances, it usually appears in the feet and ancles. It accompanies several affections of the skin, especially erysipelas; and various structural and malignant diseases, particularly those implicating the venous or lymphatic circulation. It frequently follows the inoculation of animal poisons, as the bites of serpents, &c.; and it is always attendant upon *diffusive inflammation* of the cellular tissue, and *induration* of this structure (see CELLULAR TISSUE, § 9. et seq.). Its dependence upon pressure or disease of the veins, or of the nerves, especially in the puerperal

states, has been satisfactorily illustrated by the researches of several modern pathologists, and is fully shown in these articles. It may also arise from extreme fatigue, from exhausted vital powers, the result of previous disease or of old age; it then being generally limited to the lower extremities, and unconnected with any change in the urinary secretion.

120. B. The states of organic action and circulation, from which partial cellular dropsy often proceeds, may be resolved into the following:—(a) Increased determination of the circulation, sometimes with diminished power of the exhalants, the oedematous part being firm, resisting pressure, pitting very slightly, and without any diminution, or sometimes with increase of temperature; this constitutes *sthenic* or *active* oedema.—(b) Inflammatory action in the nerves of the part, occasioning augmented determination of blood, and effusion of serum, with elevated temperature, and firm swelling, resisting or admitting only of slight and evanescent pitting, and forming an *acute* or *sthenic* oedema of rare occurrence.—(c) Obstructed circulation through either the veins or lymphatics, the part being less firm, pitting more easily, and the temperature lower than in the former: in this case, the obstruction may be either internal or external as respects the vessels, or it may exist in the glands; the oedema being either *acute* or *chronic* as to its duration, and *active* or *passive*, generally the latter, as to its grade of action.—(d) Vascular plethora, or relative increase of the watery parts of the blood, owing to diminished exhalation or elimination by the skin, pulmonary surface, or kidneys, or to the stoppage of accustomed evacuations, giving rise generally to *sub-acute* oedema, chiefly in the feet and ancles.—(e) Diminished tone of the extreme vessels or exhaling pores, attended by a laxity or lessened vital cohesion of the cellular tissue, producing *passive* or *asthenic* oedema, the part being soft, pitting easily and deeply, its temperature very much lowered. Attention to the foregoing pathological conditions and distinguishing characters will readily suggest an appropriate treatment (§ 132.).

121. ii. GENERAL CELLULAR DROPSY, or *Anasarca*, affects chiefly the sub-cutaneous cellular tissue, usually in a great degree, and very frequently in an acute or sub-acute manner. The cellular tissue throughout the body may possibly become dropsical; but this must be a very rare occurrence, and manifestly incompatible with the duration of life; although probably it may exist slightly, and constitute the *Leucophlegmatia* of CÆLIUS AURELIANUS, in which he conceives that this tissue resembles wetted bibulous paper, or a charged sponge. Indeed, a state nearly approaching to this very general or leucophlegmatial form sometimes appears in the *dark races* of the species. The anasarca described by Mr. W. HUNTER, as occurring in Lascars, seems to have been of this kind; the lungs being especially affected, giving rise to severe and often fatal dyspnœa. Anasarca presents every grade of organic action and duration; and hence it may be divided into the *acute* or *sub-acute* or *sthenic*; and the *chronic*, *passive* or *asthenic*. It may be either *primary*, as when it proceeds from cold or moisture; or *consecutive*, when it follows some one of the exanthemata;



or *symptomatic*, when it depends upon obstructed circulation about the heart or other viscera. I shall consider it accordingly.

122. *A. Primary acute and sub-acute anasarca* has been well described by STOLL, J. P. FRANK, WELLS, ABERCROMBIE, and others. It commonly occurs from exposure to cold and moisture, or from drinking cold fluids, when the body has been perspiring; and chiefly in the young, or in persons not much past the vigour of life. Oppression and uneasiness of breathing are first complained of; occasionally only tightness about the chest, without cough or pain, is felt; and sometimes cough with pain, aggravated by a full inspiration, and inability to lie down, from increased oppression of breathing, are experienced. In a few hours, seldom beyond twenty-four, the dropsical swelling makes its appearance—commonly in the face, and descending downwards to the trunk and lower limbs; sometimes in the legs; and often in both the face and lower extremities, nearly at the same time. The pulse is either a little accelerated, or of natural frequency; but generally weak or unequal, or even irregular. The urine is scanty, high-coloured, and in some cases coagulable, but in others without traces of albumen. The bowels are usually constipated, and the tongue loaded. There are also headach and thirst. If the effusion be not arrested by treatment, the swelling increases, and respiration becomes more oppressed, or even difficult; and the disease may terminate fatally in a few days, or be protracted to several weeks, or even months. This form of anasarca frequently attacks individuals belonging to the *dark races*, upon removing to a cold climate, or when the perspiratory functions, which are extremely active in them, are suddenly checked; and is generally attended with extreme dyspnoea, owing to a sub-inflammatory and oedematous state of the parenchyma of the lungs, which often become affected to the extent of producing asphyxia.

123. The *Diagnosis* of this variety of anasarca requires attention, as the swelling of the face, and oppression of breathing, with the other symptoms referred to the chest, often existing without fever or acute pain, may cause it to be mistaken for effusion into the pericardium, or into the pleural cavities. But the nature of the affection will be manifest on auscultation. These symptoms generally proceed from active congestion of the substance of the lungs, and in some cases from a state of vascular action intermediate between congestion and inflammatory action, attended by more or less serous infiltration of the parenchyma of the organ. That such conditions actually exist, to a greater or less extent, when the respiratory functions are disordered, is shown both by the stethoscopic and the rational signs, and by the appearances of inflammatory action or congestion observed in fatal cases.

124. *B. The consecutive form* of anasarca was noticed by several writers previously to J. P. FRANK, more especially by STOLL and PLENCIZ. But this celebrated physician first accurately described it, about 1790, and subsequently his pupil, GRAPENGIESSER and Dr. WELLS. It has more recently been illustrated by the observations of several writers. It may occur after any of the exanthemata, but most frequently after scarlatina, of which it is rather a common sequela,

than a consequence of suppression of either the eruption or the perspiration. It should not, however, be supposed that anasarca is the only form of dropsy that appears after the exanthemata; ascites, or hydrothorax, or even hydrocephalus, may likewise occur, and either of them may be complicated with anasarca. From a number of cases that have come before me, I conclude—(a) that it is dependent on excrementitial plethora, arising out of the suppressed or imperfectly restored functions of the skin, and other eliminating or depurating organs; (b) that an incomplete or suppressed eruption will not occasion it, unless the internal secretions and excretions be also impeded; (c) that exposure to cold, or to a cold and humid air, or even to humidity alone, will favour its occurrence, although it frequently appears without those aids, and even in very different states of the atmosphere; (d) that it is more immediately induced by febrile or generally excited vascular action, arising out of an impeded or interrupted secretion and excretion, and a consequent morbid state of the blood (a), and increase of its fluid parts, accompanied by deficient power or tone of the extreme vessels and exhaling pores, either absolutely or relatively to the action of the heart and arteries.

125. PLENCIZ describes the anasarca consequent upon scarlatina as having been more fatal in Vienna, about the middle of the last century, than the original disease; whilst Dr. CULLEN states it to be a mild and manageable affection. Its severity, probably, varies with the state of the prevailing epidemic. It is often the most severe when the cutaneous eruption and angina have been slight. There is some difference observed in the period at which it supervenes. FRANK often met with it as early as fourteen days from the commencement of the fever; whilst, in other cases, it has not come on until twenty-eight or thirty-one days from that time. It commonly appears in from sixteen to twenty-four days, and is preceded by slight fever and languor. The sore throat and fever of the primary malady generally have partially or nearly altogether disappeared, and the appetite begins to return; but the bowels continue costive, the urine scanty and high-coloured, and the skin dry and harsh. Slight increase of the fever in the evening, the patient being morose and restless, thirst, and sometimes pain about the throat, capricious appetite, and sickness, come on, and are soon followed by oedema of the face, particularly of the eyelids, which is greatest early in the morning, extending rapidly over the body. With this extension of the anasarca, there are often symptoms of vascular fulness in the head, the patient becoming somnolent, torpid, and the pulse less frequent. In other cases, symptoms of effusion into the peritoneum, or into the pleuræ, or upon the brain, or of an oedema of the lungs, are superadded, the two latter affections being attended by evidence of danger, occasionally as early as the third or fourth day. As the anasarca becomes general, or thus complicated, or even previously, the urine, which had been long scanty, assumes a still higher colour; is turbid after standing, depositing slight albuminous flocculi, or resembling whey; is voided frequently, and in very small quantity; and often with pain in the region of the bladder or in the loins, and vomitings. In some



nstances, the urine has a brown appearance, from the presence in it of some of the red particles of the blood. FRANK likens it to the washings of flesh, owing to this circumstance. It generally coagulates more or less on the application of the usual re-agents.

126. In the less favourable cases, *symptoms of danger* appear from the third to the ninth day from the commencement of the œdema of the face; but after twelve or fourteen days, they very seldom occur; convalescence often, under a judicious treatment, having commenced or proceeded far by this time. The danger in this form of anasarca depends upon its complications. —

1st. Upon active congestion, inflammatory action, or serous infiltration of the substance of the lungs, as in the primary form of the disease (§ 122.); dyspnœa, sense of oppression, constriction and anxiety in the chest, with dry cough and inability to lie down supervening, and indicating the nature of the complication:—2d. On effusion on the brain, ushered in by headach, sickness, and vomiting; and evinced by dilated pupils, slow pulse, convulsions, strabismus, loss of sight, and other signs of acute dropsy of the brain:—3d. On effusion into the pericardium, indicated by swellings of the face, neck, and hands, fulness of the veins of the neck, bloated countenance, irregular pulse, leipothymia, and fulness and tenderness of the intercostal spaces, chiefly of the left side:—4th. On effusion into the pleuræ, sometimes also associated with some effusion into the pericardium, and the symptoms of hydrothorax:—and, 5th. On disease of one or more of the abdominal viscera, either with or without effusion into the peritoneum; severe diarrhœa or dysentery occurring, and, whilst it carries off the dropsy, causing a chronic disease of the digestive mucous surface, occasionally with ulceration and its consequences; or suppression of urine from congestion or inflammation of the kidneys taking place, and aggravating all the dropsical symptoms; or obstruction of the liver superinducing an obstinate and dangerous form of ascites.

127. Anasarca consecutive of scarlatina is most frequent in children, and is rare in adults. Other eruptive diseases, beside this, give rise to dropsy of the cellular tissue, especially measles, erysipelas, urticaria, miliary fever, and many chronic diseases of the skin; owing not only to their *suppression* or retrocession, but also to impeded secretion, and to the consequent excrementitial plethora often attendant, or consequent, upon them. When it is consecutive of these diseases, it possesses either the sub-acute character common in that following scarlatina, or the more acute symptoms of the primary form.

128. *C. Primary asthenic anasarca* is not so frequent as the preceding. It is even questionable whether or not the asthenic cases, usually considered as idiopathic, are not depending either on structural change in an important emunctory, as the kidneys, or on obstruction about the right side of the heart, or congestion of the large veins and of the lungs. There can be little doubt that many of them are thus connected; yet some instances will present themselves, in which the asthenic state is primary, as far as can be ascertained. These are most likely to occur in persons living in cold, miasmatic, moist, low, imperfectly ventilated, and dark places; particularly in

those of a lymphatic or phlegmatic temperament, or who lead sedentary lives, and are insufficiently nourished; in those who have experienced copious losses of blood, or are reduced by chronic or repeated discharges, as by hæmorrhagia, diarrhœa, dysentery, &c., or who, whilst convalescent from severe exanthematous or other fevers, have been exposed to cold and humidity; and in persons under the influence of depressing emotions, or who have suffered some sudden alarm. This form of the disease may accompany retention of the menses, or chlorosis; and it may supervene also, in debilitated states of the frame, upon obstructions of the catamenial or hæmorrhoidal evacuations. Many of such cases, however, will approach very nearly to the sub-acute form, and derive benefit from evacuations. The cases of anasarca produced by terror, disappointment, surprise, mental distress, &c., and termed spasmodic by LANDRÉ BEAUVAIS, and some other writers, appear to belong chiefly to this variety. That these and similar causes are sometimes followed by anasarca, cannot be disputed; but I question the dependence of the disease on spasm. Even granting the existence of spasm, what are the parts affected by it, and how does it act? Convulsions will sometimes occasion œdema of cellular parts; but they will also, during their continuance, sometimes remove the effusion, as observed by Dr. WELLS. The causes which are supposed to act by spasm, merely derange or impede the circulation through the heart and lungs, occasionally also rendering the hepatic circulation more languid or difficult than natural, whilst they lower the vital tone of the extreme vessels, particularly in weak and irritable constitutions, and interrupt the excretory functions, thereby inducing the conditions of the vascular system most favourable to the occurrence of serous effusion. Cases rapidly produced by fright have been recorded by TISSOT, DESESSART, BEAUCHÊNE, BRESCHET, BATEMAN, and others; and numerous instances connected with disordered or delayed menstruation, and the exhausting diseases mentioned above, have been adduced by PLATER, RIEDLIN, FORESTUS PISO, WILLIS, ELLER, HOFFMANN, SAUVAGES, LEIB, MELITSCH, and later writers.

129. Asthenic anasarca generally appears slowly, and with all the signs of debility and laxity of the soft solids; whilst the sthenic disease often forms rapidly, and with many of the symptoms of fever, or increased action. The infiltration usually commences in the lower extremities; sometimes in the face, or in both; slowly extends over more or less of the body; and is most remarkable, as well as most early, in those parts of the cellular tissue which are the most lax, as the eyelids, genitals, &c. The pulse is small, soft, and occasionally slow; the skin becomes paler, whiter, and colder than usual. The surface pits much more easily on pressure, and retains the impression longer, than in the acute or sub-acute forms. At first, the infiltration of the lower extremities is most remarkable at night, and nearly disappears in the morning; but it subsequently returns earlier in the day, and to a greater extent, and is incompletely or partially dispersed by the horizontal posture; the reverse taking place as to the œdema of the face. Ultimately it becomes much more con-



siderable, more general, and more permanent, sometimes with signs of coincident or consecutive effusion into one or more of the serous cavities. But the collection is very rarely so great, or so complicated, in primary asthenic anasarca as in the symptomatic. The urine is in small quantity, and seldom contains albumen. The bowels are either sluggish or irregular, more commonly the former.

130. *D. Symptomatic anasarca* may present either acute, sub-acute, or chronic characters. But it is most frequently chronic, passive, and asthenic, and nearly resembles the primary asthenic variety now described, as respects the constitutional powers. When, however, anasarca is complicated with, or consecutive on, *acute diseases of the lungs* (§ 29.), it is also acute or sub-acute; but it is rather, in this case, a concomitant effect of the exciting causes of the pulmonary disease, than a symptomatic affection. Organic changes of the heart and kidneys are the most frequent sources of symptomatic anasarca. I shall, therefore, notice this complication more closely than the others. — (a) Anasarca generally supervenes on *chronic lesions of the heart*, and especially towards the close of life; usually commencing in the face, particularly in the eyelids, and upon rising in the morning. Sometimes the ancles begin first to swell, and occasionally both the face and ancles—the former in the morning, and the latter in the evening. The infiltration gradually increases and extends; effusion into the pleuræ, or into the pericardium, or into both, also taking place either simultaneously or subsequently.

131. (b) Anasarca caused by *disease of the kidneys* is very seldom seen unassociated with effusion into one or more of the serous cavities. It is, when thus complicated, attended by pain in the loins, by sickness, vomiting and diarrhoea: it usually commences in the lower extremities; and is commonly in consequence of irregular and drunken habits, or of the scrofulous diathesis. It is very liable to recur, and is seldom permanently removed (§ 34.). Anasarca is also sometimes a consequence of chronic disease of the lungs, particularly *chronic bronchitis*, *bronchorrhæa*, *chronic pleuritis*, and *tubercular phthisis*. In these cases, the infiltration commences either in the face or in the lower extremities, only occasionally extends as high as the thighs or hips, and seldom becomes general; but is often associated with effusion into the cavities of the chest. Organic changes of the *liver* and *uterine organs* but rarely occasion anasarca, until after effusion into the cavity of the peritoneum. The observations already offered respecting the connection of dropsy with *disease of the blood-vessels and lymphatics* (§ 27.) are entirely applicable to this species of the disease. Although complete obliteration of one even of the largest venous trunks has taken place, serous effusion will not necessarily follow, especially if a collateral circulation be established. A remarkable instance of this is recorded by Mr. WILSON, where the *vena cava* was entirely obstructed, but no vestige of serous effusion existed, — evidently proving that other pathological conditions, beside venous obstruction, are requisite to the occurrence of effusion; whilst in the case of obliterated *cava* published by LAENNEC, ascites and anasarca

of the lower limbs existed. Of the agency of disease of the vascular systems in causing local or partial anasarca, sufficient notice has been taken (§ 25. *et seq.*). The *causes*, *morbid appearances*, and *prognosis*, in anasarca, have been described under these heads in the early part of this article (§ 8. 14. 37.).

132. iii. TREATMENT. — 1st. *Of partial or local Anasarca.* — After removing the remote causes (§ 8.), the next object that we have to attain, is to restore the natural secretions and excretions, when any of these are in fault, and to remove the pathological state on which the affection depends. The restoration of the secretions will be attempted by the means appropriate to those chiefly disordered, — by purgatives, diuretics, diaphoretics, deobstruents, &c., as the intestinal, the renal, the perspiratory, and the biliary secretions, may indicate more or less of disorder or of interruption. If the oedema depend upon the *arthritic* or *rheumatic* diathesis, after the use of these means, colchicum internally, and iodine externally, may be prescribed, and aided by the support of bandages: if it proceed from *amenorrhæa*, or the final disappearance of the catamenia, a moderate bloodletting, general or local, should precede the means directed to act on the secretions. In many of such cases, as well as in others where there is no obstruction to the catamenia, particularly in females who have had children, or who are subject to constipation, and faecal accumulations in the large bowels, the *femoral veins* are either chronically inflamed, obstructed, or varicose. Their course should, therefore, be carefully examined; and if any hardness or tenderness exist, leeches ought to be applied. In old or chronic cases, however, the veins will either feel hard and obstructed, without much pain, or they will be nearly obliterated, the superficial vessels being distended and varicose, and the surface of the limb sometimes purplish or dotted with dark red spots, cold, tumid, and unyielding to the touch; pain and stiffness being referred chiefly to the lower part of the leg and ankle. In several such cases, I have prescribed, with marked benefit, deobstruent purgatives, the sub-borate of soda, and iodine; causing the patient to wear a laced stocking, and to have frequent recourse to frictions. Benefit will be derived also from frictions with mercurial liniments, united to one of those about to be referred to; and from a course of bitter aperient medicines. When the disease of the veins is connected with marked debility and weak powers of digestion and assimilation, gentle tonics, chalybeates, frictions with stimulating and deobstruent liniments (§ 65.), will accelerate a cure. (See PHLEGMATIA DOLENS and VEINS; — *Diseases of.*)

133. The connection of oedema with *amenorrhæa*, independently of obstruction in the veins, requires a persevering internal use of iodine, or of the sub-borate of soda, with tonic aperients, or the compound decoction of aloes, &c., preceded by general or local depletion when signs of plethora or internal congestion are present. But when there are a chlorotic appearance of the countenance and surface, or irregular manifestations of hysteria, with great mobility of the muscular, and susceptibility of the nervous, system; a weak, soft, open, or undulating pulse; and



especially if the catamenia have not appeared, or, having imperfectly commenced, have disappeared; the disorder may have been induced or perpetuated by manustupratio, and require from the commencement a tonic and stimulating treatment, and the liberal use of the preparations of iron. When aperients are necessary, the compound decoction of aloes with the compound mixture of iron; and the pil. ferri comp. with the aloes and myrrh pill, or with aloes only; are amongst the best.

134. When œdema of the lower limbs depends on the pressure of the gravid uterus, cooling aperients, especially the confection of senna with cream of tartar, small bloodlettings if there be vascular oppletion, a light diet, the recumbent posture, pure air, and patience, are the chief remedies. When the local anasarca is caused by the pressure of enlarged or diseased glands, mercurial deobstruents, internally and externally, the preparations of iodine, or the ioduret of mercury, may be used, and the secretions and excretions promoted and duly evacuated by deobstruent purgatives; or with a combination of tonics and aperients. The taraxacum with the alkaline carbonates, and either the liquor potassæ, or the oxymuriate of mercury in very minute doses, taken in the compound decoction of sarsaparilla, or in the concentrated preparation of Messrs. SAVORY and MOORE, have been of essential service in several cases in which I have prescribed them.

135. 2d. *Of general Anasarca.*—*A. Of primary acute and sub-acute anasarca*, little beyond what has been advanced respecting the treatment of acute dropsies (§ 40, 41.) need be here stated. If any difference in the measures is at all admissible, it respects merely a more energetic adoption of depletion, and a greater necessity for repeating it, in this than in any other species of dropsy, especially in its acute states, occurring in young, plethoric, and robust subjects. The instructive case published by Dr. GRAHAM is an excellent illustration of this practice. When the patient complains of pain in the loins, and the urine is very scanty, or nearly suppressed, general bleeding will often be advantageously followed by cupping on the region of the kidneys. In addition to vascular depletions, the same remedies, especially purgatives or cathartics, directed in nearly the same succession and manner, as described at the places referred to, and at § 55., should be employed; and lastly, *diuretics*, associated in the way there advised, may be resorted to. It is obvious, however, that the extent to which the antiphlogistic treatment should be carried, must depend upon the nature of the case, and the acumen of the physician in detecting those latent states of active congestion, or of increased organic action, to which acute dropsies so often are owing.

136. *B. In consecutive acute anasarca*, appearing in the manner described (§ 124, *et seq.*), a nearly similar treatment to the above, in a less active form, however, in many cases, will be required. The sources of danger in this form of the disease, particularly when it follows scarlatina or measles, should always receive attention; and the remedies ought to be so directed as to prevent their accession. The directions already given (§ 40.) respecting general or local bleedings, should be strictly followed; and active counter-irritation and external

derivation,—as the application of a large blister upon the nape of the neck, or between the shoulders,—be afterwards resorted to, especially if symptoms of cerebral oppression, or of affection of the thoracic organs, manifest themselves. If tenderness on pressure be felt in any part of the parietes of the chest or abdomen, or of the region of the heart, inflammatory irritation in the pleuræ, peritoneum, or pericardium, should be dreaded, and local depletions at some distance from the seat of pain, followed by external irritants and derivatives (§ 57.), be prescribed. If sickness and vomiting come on, an inflammatory affection of the head should be suspected, and be treated by active depletion and cathartics. In some cases, however, the vomiting depends upon disease of the kidneys; attention, therefore, should be paid to this circumstance. When *diarrhœa* is present, the supervention of ascites, or the existence of lesions of the kidneys, is to be feared. Without suddenly checking this discharge, means should be used to moderate it if it be caused by inflammatory action, and to evacuate offending matters if it seem to proceed from this cause. Leeches should be applied to the abdomen or its vicinity—to the anus or sacrum, if there be tenesmus—and be followed by hot fomentations, especially the terebinthinate; and, if the evacuations be offensive, scybalous, knotty, &c. a full dose of castor oil, or any other purgative, as calomel and jalap, &c. should be taken, and a full effect be promoted by purgative or laxative and emollient enemata. Afterwards *digitalis* may be exhibited, with liquor ammoniæ acetatis, infus. taraxaci, and syrupus scillæ; or the ammoniated spirit of *colchicum* may be given in a similar form.

137. In all cases, of both the *primary* and *consecutive* disease, the propriety of acting upon the secretions and excretions should be kept in view. In the former state especially, the cathartics, particularly those which act as hydragogues, as *elaterium*, *croton oil*, the *euphorbia lathyris*, and others enumerated above (§ 66.), may be prescribed with due caution; but, in the latter form, the common purgatives, as calomel and jalap, or the infusion of senna with some neutral salt, will be sufficient. The restoration of the cutaneous functions should be a chief object in the treatment of consecutive anasarca. With this intention, tepid bathing in acute cases, when the temperature of the surface is increased; and warm bathing (AASKOW) in the sub-acute; and the various medicated baths already noticed; may be directed, and be followed by gentle friction of the surface with warm oil, as advised by SCHMIDTMANN; or with sweet oil, as used by OLIVER, &c.; or with almond oil. I have adopted this treatment in several cases of anasarca following scarlatina, and seen benefit derived from it. As to the use of *diuretics*, it is unnecessary to add to what is stated in other places (§ 71.) respecting them.

138. 3d. *In Primary Asthenic Anasarca*, the preparations of iodine, the ferrum tartarizatum, with cream of tartar; the balsams and terebinthines; sulphur; the association of tonics with purgatives and the warmer diuretics; chalybeates; and the rest of the tonic treatment recommended above (§ 42, 43.) are chiefly to be depended upon. In many cases of this description, the preparations of *digitalis* or of *squills* may be added to bitter vegetable infusions and



decoctions, and some one of the neutral salts; and *cantharides* may be tried, as advised by CHALMERS, ALIX, &c. The following also may be employed; the first of which has been recommended by M. DUMAS, the latter by Mr. SPRAGUE:—

No. 187. R. Antimonii Pulver. gr. xx.; Croci Martis Aperit. gr. xxv.; Pulv. Scillæ gr. xij.; Gum. Ammoniaci 3j.; Extr. Dulcamaræ 3ij.; Olei Juniperi q. s. M. Contunde in massam æqualem, et divide in Pilulas lx., quarum capiat binas vel tres bis terve in die.

No. 188. R. Decocti Spartii Cacum. (F. 75.) 3x.; Potassæ Acet. ʒij.; Spirit. Æther. Nit. et Spir. Lavand. Comp. āā 3j. M. Fiat Haustus ter in die sumendus.

No. 189. R. Decoct. Spart. Cac. 3x.; Liq. Ammoniac Acetatis ʒss.; Spirit. Æther. Nit. 3jss.; Tinct. Scillæ 3ss.; Tinct. Capsici ℥x. M. Fiat Haustus ter die capiendus.

139. 4th. *The Symptomatic, Chronic, or Passive states of Anasarca*, require the same intentions and means of cure as have been already stated (§ 44. *et seq.*), but with a strict reference to the nature of the organic change with which it is connected, as far as that may be ascertained. Anasarca dependent upon disease of the *lungs* is sometimes benefited by local bloodletting, but the practice requires the utmost discrimination. It is seldom admissible in aged patients; but in the younger and more robust, and when the pulmonary disease consists of active congestion or inflammatory action in the substance of the organ, or if the congestion be associated with obstructed circulation through the heart, moderate local depletions, repeated in the more acute cases, will be of service: when anasarca follows chronic bronchitis, or tubercular phthisis, it will seldom be productive of benefit, and in the former may be injurious. External derivation, actively and perseveringly employed, is more generally appropriate. In this form of the disease, the preparations of colchicum or of digitalis cautiously exhibited, and the rest of the treatment directed in the manner described above (§ 49.), will afford more or less relief.

140. When the disease of the *heart*, associated with anasarca, is of an active kind, and the patient is plethoric or robust, local depletions, followed by hydragogue purgatives and digitalis, are requisite. But, if it be of a passive or atonic kind, an opposite practice is indicated. The particular remedies that may be used in these cases have been fully stated (§ 45. *et seq.*). If the *liver* be diseased as well as the heart, the prolonged and daily use of deobstruent purgatives (§ 66. *et seq.*) and diuretics; the alkaline carbonates, with extract or decoction of taraxacum; a discriminating use of mercurial purgatives; calomel with digitalis, as advised by WIEDEMANN; cream of tartar with sulphur and sub-borate of soda, as recommended by PIDERIT; and the ammoniated preparation of colchicum, with the sub-carbonates and bitter infusions, and some diuretic tincture or spirit; will be productive of advantage. When the effusion seems to arise from disease of the *kidneys*, the treatment already recommended (§ 52.) may be tried. The effects of remedies on the urine, and on the symptoms referable to the kidneys, ought to be carefully watched. Cream of tartar with borax, the alkalies with the uva ursi, the acetum scillæ saturated with potash (SACKENREUTER), the balsams with magnesia or the carbonates, and external derivatives, or counter-irritation, may be employed. Dr. VENABLE recommends cupping on the loins, and the insertion of issues in that situation; and I have

seen benefit derived from the practice. But when these organs are manifestly diseased, no permanent good effect can be expected from medicine. The connection of anasarca with *uterine disease* requires but little additional remark. The means already described (§ 53.) are quite appropriate to this species of dropsy. When, however, hysteria is present, the more cooling tonics, as the decoction of cinchona with the liquor ammoniac acetatis, nitre, and the nitric æther; or vegetable bitters, with alum and opium, as advised by LEIB; tonic infusions with an alkaline carbonate, nitrate of potash and squills, &c.; will generally be serviceable.

141. The treatment now described will require constant modification, in respect both of the association of different classes of medicines, and in the combination of those possessed of analogous properties—as regards conjoining tonics with purgatives, or various diuretics one with another. The remarks offered above, as to the numerous medicines which have been employed in dropsies (§ 54. *et seq.*), will assist the practitioner in selecting from amongst them for the removal of anasarca, whether this species exist simply, or in conjunction with effusion into one or more of the serous cavities. The *pyrola umbella*, recommended by Dr. SOMERVILLE, and more recently by Dr. BEATTY and Dr. SEYMOUR; and the *liverwort*, employed in the manner pointed out by Dr. SHORTT, should be duly tried.

142. The propriety of having recourse to *scarifications and punctures* has been much questioned. But it entirely depends upon the circumstances of the case, and the manner of making them. When the limb is cold, pits deeply, and retains the impression long; when the patient is old, and, from the irregularity of the pulse, &c., probably has ossified arteries; and when livid or dark spots appear in the extremities; scarifications will be attended by much risk of being followed by sloughing sores, although *acupuncturation* may be substituted with advantage, as recommended and employed successfully by Mr. CHURCHILL. Indeed, this seems to be the preferable mode of attempting to evacuate the collected fluid. Dr. KOENIG advises the use of *electro-puncturation*. It is a question whether or not acupuncturation may not be preferable to any other mode of puncturing in this disease. Several practitioners direct small punctures with the point of a lancet, as the safest and best mode of directly evacuating the infiltrated fluid. This practice was praised by COL DE VILLARS, GUENALT, ADET, THILENIUS, and some later writers. In several instances of sloughing sores consequent upon the rupture of the skin, and upon scarification, I have seen the most decided benefit derived from the application of a cloth moistened with spirits of turpentine over them. This medicine causes a rapid subsidence of the swelling, and restores the cohesion of the rarified and weakened tissue surrounding the divided or destroyed parts.

BIBLIOG. AND REFER.—*Hippocrates*, Περὶ νόσων, l. ii. i. 10.—*Celsus*, l. iii. cap. 21.—*Galen*, De Locis Affect. l. v. cap. 7.—*Oribasius*, vii. c. 35.—*Cælius Aurelianus*, p. 470.—*Aëtius*, Tetrab. iii. s. ii. cap. 28.—*Alexander Trallianus*, l. iii. cap. 29. (*Bloodletting and antiphlogistics*).—*Avicenna*, Canon. l. iii. fen. xiv. tr. iv. cap. 14. (*Venæsection*).—*Plater*, Observ. l. iii. p. 630.—*Willis*, Pharmac. Rationalis, pars ii. s. ii. cap. 5.—*Lossius*, De Languore Lymphatico Αναρροη. Witeb. 1673.—*Forestus*, l. xix. obs. 25, 26, 35.—*Riedlin*, Millenarius,



## Form. 464. PILULÆ ANTIMONII ALTERATIVÆ.

R Sulphur. Aureat. Antimon. ʒj.; Florum Sulphuris 3 ij.; Camphoræ rasæ ʒj.; Extracti Taraxaci (vel Extr. Sarsæ) ʒiijss. Fiat massa æqualis, et divide in Pilulas xcv. Capiat binas vel tres ter quotidie.

## Form. 465. PILULÆ ANTIMONII ET GUAIACI COMPOSITÆ.

R Sulphuret. Aur. Antimonii ʒj.; Florum Sulphur. 3 iij.; Resin. Guaiaci, Extr. Conii, aa 3 ij.; Syrup. Althææ q. s. Fiat massa æqualis, et divide in Pilulas cxx. Capiat binas vel tres ter die.

## Form. 466. PILULÆ ANTIMONII SULPHURETI COMP. (1.)

R Antimonii Sulphur. Præcip. gr. v.; Pulv. Hydrargyr., Extract. Hyosciami, aa ʒj. Misce ut fiat massa æqualis in Pilulas decem dividenda, quarum sumatur una ter die.

## Form. 467. PILULA ANTIMONII SULPHURETI COMP. (2.)

R Sulphureti Antimonii Præcipitati, Hydrargyri Submuriatis, aa gr. ss.; Extracti Conii gr. iv. Fiat Pilula ter die sumenda.

## Form. 468. PILULÆ ANTISPASMODICÆ.

R Gum. Ammoniaci 3j.; Benzoini, Pulv. Myrrhæ, aa ʒj.; Assafoetidæ 3 ss.; Camphoræ ʒj.; Tinct. Opii ʒij. Misce. Divide in Pilulas lx., quarum capiat æger, omni trihorio, pilulas duas vel tres.

## Form. 469. PILULÆ ANTISPASMODICÆ PIERQUINIL.

R Camphoræ, Potassæ Nitratis, Digitalis Purpur., aa 3 ss.; Pulv. Cinchonæ Flav. 3j.; Extract. Gentianæ 3 ij.; Syrup. Simp. q. s. M. Fiant Pilulæ lx.

## Form. 470. PILULÆ APERIENTES COMP.

R Pilul. Hydrarg., Pilul. Aloes cum Myrrhâ, aa ʒj.; Pilul. Cambog. Comp. gr. xvj.; Pulv. Mastiches gr. vj.; Olei Caryoph. ʒij. M. Fiat massa æqualis, et divide in Pilulas xxiv., quarum capiat binas horâ somni quotidie.

## Form. 471. PILULÆ APERIENTES ALTERATIVÆ.

R Pilul. Hydrarg. ʒj.; Antimonii Tartarizati gr. jss.; Extr. Jalapæ 3 jss.; Fellis Tauri inspissati 3 ss.; Saponis Castil. gr. xv. Contunde in massam æqualem, et divide in Pilulas xl.; quarum capiat binas vel tres omni nocte.

## Form. 472. PIL. ARGENTI NITRATIS ET BELLADONNÆ.

R Argenti Nitratis pulv. gr. ij.; Pulv. Radicis Belladonnæ ʒj.; Extr. Glycyrrh. 3j. Misce bene, et divide in Pilulas xxxvj.; quarum capiat unam ad tres bis terve quotidie. (In Pertussis and Epilepsy. M. BORIES.)

## Form. 473. PILULÆ ARGENTI NITRATIS COMPOSITÆ.

R Nitratis Argenti pulv. gr. v.; Opii Puri gr. x.; Camphoræ rasæ, Nucis Myristicæ, aa ʒjss.; Pulv. Acaciæ 3 ss.; Syrup. Simp. q. s. M. Divide in Pilulas xxxvj., quarum capiat unam ad tres bis terve quotidie.

## Form. 474. PILULÆ ARGENTI NITRATIS ET GENTIANÆ.

R Argenti Nitratis gr. ix.; Opii Puri gr. v.; Extr. Gentianæ, Extr. Glycyrrh., aa 3 jss. Divide in Pilulas lv., quarum unam ad tres vel quatuor, bis terve quotidie. (NIEMANN.)

## Form. 475. PILULÆ ARGENTI NITRATIS OPIATÆ.

R Argenti Nitratis pulv. gr. x.; Moschi 3j.; Opii 3 jss.; Camphoræ 3 ij.; Pulv. Acaciæ 3 ss.; Syrup. Simp. q. s. Misce bene, et divide in Pilulas lxxx., quarum capiat unam ad quatuor bis terve quotidie. (VAN MONS, CADET DE GASSICOURT, et RATIER.)

## Form. 476. PILULÆ ARSENICALES. (1.)

R Arsenici Albi gr. ij.; Opii Puri gr. viij.; Saponis Medic. gr. xxxvj. Divide in Pilulas xxiv., quarum capiat j.—iij. pro dose.

## Form. 477. PILULÆ ARSENICALES (2.)

R Arsenici Albi gr. vj.; Opii gr. xij.; Ammoniac Mur. 3 ss.; Mucilag. Acaciæ ʒij.; Syrup. Simp. q. s. M. Divide in Pilulas xxx., quarum capiat unam vel binas ter die.

## Form. 478. PILULÆ ARSENIATIS FERRI. (BIETT.)

R Proto-Arseniat. Ferri gr. iij.; Extr. Humuli 3 ij.; Pulv. Althææ 3 ss.; Syrup. Auran. q. s. M. Divide in Pilulas xlvij., quarum capiat unam in die.

## Form. 479. PILULÆ ASSAFOETIDÆ GUM CINCHONA.

R Assafoetidæ Gummi Resinæ 3j.; Extracti Cinchonæ Opt. 3 ij. Saponis Duri, 3 ss.; Olei Pulegii ʒij. Theriac. Purificat. q. s. ut fiat massa: in Pilulas xlvij. divide; quarum capiat iij. vel iv. nocte manêque.

## Form. 480. PILULÆ ASSAFOETIDÆ COMPOSITÆ.

R Assafoetid., Castore, Valerianæ, Succini, aa pulveriz. 3 ss.; Camphoræ gr. x.; Olei Cajeputi q. s. M. Fiant Pilulæ xxxvj.; quarum capiat binas pro dose.

## Form. 481. PILULÆ ASSAFOETIDÆ CUM FELLE.

R Assafoetid., Fell. Tauri inspissat., aa 3j.; Pulv. Rhei ʒj.; Syrup. q. s. M. Fiant Pilul. xl.

## Form. 482. PILULÆ ASSAFOETIDÆ ET VALERIANÆ COMP.

R Gum. Assafoetidæ, Pulv. Valerianæ, aa 3j.; Extr. Aconiti gr. vj.; Pulv. Scillæ gr. viij.; Castorei 3 ss.; Ammoniac Subcarbon. gr. xvj.; Syrup. Papaveris q. s. M. Fiant Pilulæ xlvij., quarum capiat binas ad quatuor pro dose. (In Spasmodic Affections of the respiratory Organs. — RICHTER.)

## Form. 483. PILULÆ ASTRINGENTES.

R Extr. Cinchonæ, Ferri Ammoniaci, Aluminæ Sulph., Pulv. Aromat., aa 3jss. Olei Caryoph. q. s. M. Fiant Pilulæ lxxxiv.; quarum j.—ij. pro dose.

## Form. 484. PILULÆ BALSAMÆ COMP.

R Myrrhæ Gummi Resinæ pulv. ʒij.; Galbani, Assafoetidæ, aa ʒj.; Capsici Annui Pulv. gr. xv.; Balsami Peruviani 3j. M. Fiant Pilulæ xxx.; e quibus sumantur binæ vel tres, bis terve de die.

## Form. 485. PILULÆ BALSAMICÆ. (1.)

R Extr. Aloes 3ij.; Extr. Rhei 3j.; Balsam. Peruv. et Benzoini, aa 3 ss.; Croci Stigmat. et Myrrhæ, aa ʒj.; Extr. Opii gr. v.; Spirit. Vini et Syrup. q. s. ʒ lxxx.; quarum capiat unam ad quatuor pro dose.

## Form. 486. PILULÆ BALSAMICÆ. (2.)

R Terebinthinæ Chiensis, Spermaceti, aa 3ij.; Pulv. Myrrhæ 3j.; Olibani Pulver. q. s. ut fiat Pilulæ lxx.; quarum capiat unam vel duas omni tertiâ vel quartâ horâ.

## Form. 487. PILULÆ BALSAMICÆ CAMPHORATÆ.

R Acidi Benzoini 3j.; Camphoræ, Croci Stig., Balsam. Peruvian., G. Ammoniaci, aa ʒj.; Mucilag. Acaciæ q. s. M. Fiat massa æqualis; divide in Pilulas xxxvj., quarum capiat binas pro dose.

## Form. 488. PILULÆ BELLADONNÆ.

R Extr. Belladonnæ gr. vj.; Pulv. Rad. Glycyrrh. 3 ss.; Succ. Inspissat. Sambuci Nig. q. s. ut fiant Pilulæ xij. Capiat unam ad tres pro dose.

## Form. 489. PILULÆ BENZOINÆ ET TEREBINTHINÆ COMP.

R Myrrhæ, G. Ammoniaci, aa 3 jss.; Benzoini 3j.; Extr. Gentianæ ʒij.; Terebinth. Venet. 3 jss.; Pulv. Rhei q. s. Fiat Massa æqualis, et divide in Pilulas gr. iv. pond. (In Hypochondriasis, Habitual Constipation, &c.)

## Form. 490. PILULÆ BISMUTHI.

R Bismuthi Sub-nit., Castorei, aa gr. j.—ij.; Pulv. Glycyrrh. et Mellis q. s. ut fiant Pilulæ ij., tertiis vel quartis horis sumendæ.

## Form. 491. PILULÆ BRUCINÆ.

R Brucinæ Puræ, gr. xii.; Conserv. Rosar. ʒij. Misce benè, et divide in Pilulas xxiv. æquales. Capiat unam ad quatuor pro dose.

## Form. 492. PILULÆ CAMBOGIÆ COMPOSITÆ.

R Cambogiæ 3j.: solve in Olei Ricini pauxillo, et adde Pilul. Aloës cum Myrrhâ, Pilul. Galban. Comp., Pilul. Hydrarg., aa ʒij. Contunde benè simul, et divide in xlvij. Capiat unam ad tres pro dose.

## Form. 493. PILULÆ CAMPHORÆ ET ANTIMONII THEBAIACÆ.

R Camphoræ rasæ gr. iv.; Pulv. Jacobi Veri gr. iij. Opii Puri gr. ss.; Syrup. Simp. q. s. Fiant Pilulæ ij. quartâ vel sextâ quâque horâ sumendæ.

## Form. 494. PILULÆ CAMPHORÆ COMP. (BRERA.)

R Camphoræ, ʒj.; Potassæ Nitratis ʒij.; Kermes Mineralis gr. vj.; Pulv. Glycyrrh. et Mellis, aa q. s. M. Divide in Pilulas xlvij., quarum capiat duas tertiâ quâque horâ.



Form. 495. *PILULÆ CAMPHORÆ ET IPECACUANHÆ COMP.*  
 R Pulv. Ipecacuanhæ Comp. gr. iv.; Camphoræ rasæ gr. j—iij.; Syrup. Papaveris q. s. M. Fiant Pilulæ iij., quartâ quâque horâ sumendæ.

Form. 496. *PILULÆ CAMPHORÆ ET NITRI.*

R Camphoræ Subactæ, Potassæ Nitratis, aâ gr. ij. — v.; Conserv. Rosar. q. s. M. Fiant Pilulæ ij. vel iij.

Form. 497. *PILULÆ CASTOREI THEBAIACÆ.*

R Opii gr. ss.; Castorei Rossici gr. vjss.; Pulveris Digitalis gr. j.; Syrup. q. s. Fiant Pilulæ duæ, bis vel ter die sumendæ. (In Spasmodic Asthma, and Dyspnoea.)

Form. 498. *PILULÆ CATHARTICÆ. (1.)*

R Hydrarg. Submur. gr. viij.; Extr. Res. Jalap. gr. xvj.; Gum. Guaiaci gr. xxiv.; Mucilag. Acaciæ q. s. M. Divide in Pilulas xij. Capiat binas vel tres pro re natâ.

Form. 499. *PILULÆ CATHARTICÆ. (2.)*

R Cambogiæ Gum. 3jss.; Scammon. 3j.; solve terendo in pauxillo Olei Junip.; dein adde Aloës Socot. 3ijss.; Gum. Ammoniæ 3jss.; Potassæ Sulphatis 3j.; Oxymel. Scillæ q. s. ut fiat massa æqualis. Capiat pro dose gr. x. ad gr. xxx.

Form. 500. *PILULÆ COLOCYNTHIDIS COMPOSITÆ.*

R Colocynthidis Pulpæ 3ss.; Aloës Spicatæ Extracti Scammoniaci Gummi Resinæ, aâ 3j.; Saponis Duri 3ij.; Olei Caryophylli 3j. Aloë, Scammonia, et Colocynthis pulpa in pulverem redigantur; tum cum Sapone atque Oleo conterantur; denique cum Mucilage Acaciæ subigantur in massam.

Form. 501. *PILULÆ COLOCYNTHIDIS CUM HYDRARGYRO.*

R Massa Pil. Colocynth. Composit. 3iv.; Hydrargyri Protochlorid. (Calomel) 3j. Simul contunde in mortario lapideo, donec massa æqualis sit; et in pilulas lx. æquales distribuenda. Dosis, ab j. ad iv. pro re natâ.

Form. 502. *PILULÆ CUPRI SULPHATIS CUM OPIO.*

R Cupri Sulphatis gr. vj.; Opii Puri gr. iv.; Pulv. Tragacanth. Comp. 3j.; Mucilag. Acaciæ q. s. ut fiant Pilulæ xij.; quarum capiat unam ter die, postea quater quotidie, vel tertiis aut quartis horis. (Chronic Diarrhœa and Dysentery.)

Form. 503. *PILULÆ DEOBSTRUENTES. (1.)*

R Antimonii Tartarizati gr. iv.; Pilul. Hydrarg. 3j.; Saponis Castil., Gum. Ammoniæ, Assafoetidæ, Extr. Aloës Purif., aâ 3ss. Misce benè, et divide in Pilulas lxxv.; quarum capiat binas ter die.

Form. 504. *PILULÆ DEOBSTRUENTES. (2.)*

R Extr. Aquosæ Aloës 3ij.; Gum. Ammoniæ 3ij.; Myrrhæ, Mastiches, Benzoini, Rhei, aâ gr. 3j.; Croci Stigm. gr. xvj.; Potassæ Sub-carbon. 3ijss.; Mellis q. s. ut fiat massa æqualis. Capiat gr. x. ad xx. pro re natâ.

Form. 505. *PILULÆ DEOBSTRUENTES. (BARTHEZ.) (3.)*

R Kermes Mineral. gr. j.; Hydrarg. Submur. gr. ij.; Extr. Fumariæ (Extr. Taraxaci) gr. x. Fiant Pilul. iij., pro dose.

Form. 506. *PILULÆ DEOBSTRUENTES. (RECAMIER.) (4.)*

R Saponis Castil. 3ijss.; Gum. Ammoniæ 3j.; Aloës Extr. Purif. gr. xv.; Assafoetidæ 3ss.; Pulv. Rhei 3j.; Croci Sativi 3ss.; Syrup. q. s. M. Fiant Pilulæ lxxxiv., quarum capiat binas bis quotidie.

Form. 507. *PILULÆ DEOBSTRUENTES. (5.)*

R Saponis Hisp. 3ij.; Gum. Ammoniæ 3j.; Aloës 3j.; Rhei Pulv. 3j.; Assafoetidæ, Croci, aâ 3ss.; Syrup. q. s. M. Divide in Pilulas c. Capiat binas ad quatuor bis terve in die.

Form. 508. *PILULÆ DEOBSTRUENTES. (6.)*

R Saponis Medicinalis 3iv.; Gum. Ammoniæ 3ij.; Extracti Conii, Extr. Aconiti Napel., aâ 3jss.; Massæ Pilul. Aloës cum Myrrhâ 3j. Contunde in massam æqualem, et divide in Pilulas granarum quatuor.

Capiat binas manè nocteque, augendo unam quotidie donec xv. vel xx. sumantur in die. (Dr. LOWASSY, in Glandular Tumours and Scirrhus Formations.)

Form. 509. *PILULÆ DEOBSTRUENTES. (STOLL.) (7.)*

R Antimonii Sulphureti Præcipitati 3j.; Saponis Venetii 3ij.; Gummi Acaciæ 3j.; Mucilag. Gum. Tragacanth. q. s. Fiant Pilulæ L. Sumat tres manè et nocte. (For Cutaneous Eruptions, Rheumatism, &c.)

Form. 510. *PILULÆ DEOBSTRUENTES. (8.)*

R Hydrarg. cum Cretâ gr. xvj.; Sodæ Sub-carbon. exsic. 3j.; Extracti Taraxaci 3j. M. Fiant Pilulæ xx.; quarum capiat binas vel tres omni nocte.

Form. 511. *PILULÆ DEUTO-IODURETI HYDRARGYRI.*

R Hydrarg. Deuto-Iodureti gr. ij.; Extr. Humuli 3ij. Pulv. Glycyrr. q. s. Misce benè, et divide in Pilulas xvi.; quarum capiat binas manè nocteque, et augea dosin ad tres vel quatuor.

Form. 512. *PILULÆ DIAPHORETICÆ.*

R Oxydi Zinci, Extracti Aconiti, aâ xij.; Sulphureti Antimonii Aurat. gr. vi.; Extracti Humuli 3j.; Syrup. Papaveris q. s. Contunde benè simul, et divide in Pilulas xvij.; quarum capiat unam secundâ vel tertiâ quâque horâ. (In Chorea, Sciatica, Hysteria, and Rheumatism.)

Form. 513. *PILULÆ DIAPHORETICÆ SEDATIVÆ.*

R Kermes Mineral., Extr. Opii, aâ gr. ij.; Potassæ Nitratis gr. v.; Syrup. q. s. Fiant Pilulæ ij. pro dose.

Form. 514. *PILULÆ DIGITALIS ET CAMPHORÆ COMP.*

R Pulveris Digitalis gr. vj.; Camphoræ gr. xv.; Extracti Hyoscyami 3jss. Fiant Pilulæ duodecim. Sumat tres omni nocte. (In Maniacal and Spasmodic Affections.)

Form. 515. *PILULÆ DIGITALIS ET MYRRHÆ COMP.*

R Myrrhæ G. R. gr. ij.—iv.; Pulv. Digitalis gr. j.; Extr. Hyoscyami gr. iij.—v.; Syrup. q. s. Fiant Pilulæ ij., bis terve quotidie sumendæ.

Form. 516. *PILULÆ DIURETICÆ.*

R Scillæ Rad. pulver. gr. ij.; Pulv. Foliorum Digitalis gr. j.; Pilulæ Hydrargyri gr. vj.; Olibani Pulver. 3ss.; Olei Juniperi 3ij. Fiat massa in Pilulas quatuor dividenda, è quibus capiat ij. horâ somni, superbibendo haustulum Misturæ Diureticæ, No. 398 vel 399.

Form. 517. *PILULÆ DIURETICÆ ALTERATIVÆ.*

R Potassæ Supertart. 3j.; Sub-boracis Sodæ 3jss.; Pulv. Rad. Polygalæ Senegæ 3j.; Pulv. Radicis Colchici exsic. 3ij.; Pulv. Scillæ gr. xvj.; Extr. Taraxaci 3ij. Fiat massa æqualis, et divide in Pilulas c.; quarum capiat tres ter quotidie.

Form. 518. *PILULÆ DULCAMARÆ ET ANTIMONII.*

R Antimonii Sulphurat. Nig., Pulv. Stip. Dulcamaræ, aâ 3j.; Extr. Dulcamaræ 3ij.; Syrup. Tolutan. q. s. M. Fiant Pilulæ lx. (RICHTER, in Scrofula. Also in Cutaneous Diseases.)

Form. 519. *PILULÆ EMMENAGOGÆ.*

R Aloës Socot., Myrrhæ, aâ 3jss.; Galban., Gum. Ammoniæ, aâ 3ij.; Sub-boracis Sodæ 3jss.; Ferri Sulphatis 3ss.; Ferri Oxydi 3j.; Rhei 3j.; Olei Rutæ et Olei Sabinæ, aâ 3ij.; Saponis q. s. Fiat massa æqualis, et divide in Pilulas cxx.; quarum capiat binas vel tres bis terve quotidie.

Form. 520. *PILULÆ EXTR. GENTIANÆ ET HUMULI COMP.*

R Extracti Gentianæ 3ij.; Saponis Medicin. 3jss.; Fell. Tauri inspiss.; Ext. Aloës Purif. aâ 3j.; Ext. Humuli 3jss. Misce, et divide in Pilulas pond. gr. iij.; quarum capiat binas vel tres manè nocteque.

Form. 521. *PILULÆ FERRI AMMONIATI.*

R Ferri Ammoniaci 3j.; Extracti Aloës, Extracti Gentianæ, aâ 3ss. Contunde simul, et divide massam in Pilulas triginta; quarum sumat duas ter quotidie. (In Dyspepsia, Hysteria, Scrofula, and Mesenteric Obstructions.)

Form. 522. *PILULÆ FERRI AMMONIATI COMPOSITÆ.*

R Ferri Ammoniaci 3j.; Extr. Gentian. et Extr. Aloës aâ 3ij. Contunde simul, et divide massam in Pil. xxxvj.; è quibus binæ, bis terve quotidie, sumantur.



## Form. 523. PILULÆ FERRI APERIENTES. (1.)

R. Ferri Sulphatis, Potassæ Sulphatis, aa 3 j.; Galbani, Assafœtidæ, aa 3 jss.; Ammonia Muriatis 3 ij.; Massæ Pilul. Aloës cum Myrrhâ 3 iij.; Theriacæ Purif. q. s. Contunde in massam æqualem, et divide in Pilulas cl.; quarum capiat binas bis terve quotidie.

## Form. 524. PILULÆ FERRI APERIENTES. (2.)

R. Ferri Sulphatis, Potassæ Sulphatis, aa 3 j.; Galbani, Assafœtidæ, aa 3 jss.; Extr. Gentianæ 3 ij.; Massæ Pilul. Aloës cum Myrrhâ 3 iij.; Theriacæ Purif. q. s. Contunde in massam æqualem, et divide in Pilulas cl.

## Form. 525. PILULÆ GUAIIACI COMP. (1.)

R. Gum. Guaiaci 3 ij.; Saponis Venet. 3 j.; Calomelanos, Sulphur. Antimonii Aur., Pulv. Rad. Senegæ, Camphoræ, aa gr. xvj.; Aceti Scillæ q. s. Fiat massa æqualis, et divide in Pilulas lxxx.; quarum capiat duas vel tres bis terve quotidie.

## Form. 526. PILULÆ GUAIIACI COMP. (2.)

R. Gum. Guaiaci 3 ij.; Calomel., Sulph. Antimonii Aur., aa 3 ss.; Mucilag. Acaciæ q. s. M. Fiant Pilulæ l. capiat ij.—iv. pro dose (Cutaneous Affections.)

## Form. 527. PILULÆ GUAIIACI COMPOSITÆ. (3.)

R. Guaiaci Gummi Resinæ pulv. 3 ij.; Pulv. Opii Crudi gr. vj.; Hydrargyri Protochlorid. (Calomel) gr. xij.; Antimonii Tartarizati gr. iv.; Tincturæ Myrrhæ q. s. ut fiat massa, in Pilulas xxxvj. dividenda. Dosis, ij. vel iij. nocte manèque.

## Form. 528. PILULÆ GUAIIACI ET ANTIMONII COMP.

R. Pulv. Jacobi Veri 3 j.; Resin. Guaiaci in Pulv., Massæ Pilul. Aloës cum Myrrhâ, aa 3 jss.; Syrup. Simp. q. s. Fiat massa æqualis, et divide in Pilulas xlvij. Capiat binas ad quatuor pro dose. (Emmenagogue, Stomachic, Aperient, and Antirheumatic.)

## Form. 529. PILULÆ HELLEBORI ET ALOES COMP.

R. Extr. Rad. Hellebor. Nig., Aloës Ext. Purif., Ferri Ammoniat., aa 3 j.; Croci Stigmat. 3 ss.; Opii Puri gr. v.; Syrup. q. s. M. Fiant Pilulæ l., quarum capiat binas vel tres.

## Form. 530. PILULÆ HYDRARGYRI ANODYNÆ.

R. Pilul. Hydrargyri, Pulveris Ipecacuanhæ Compos., Extract. Hyoscyami, aa gr. v.; Fiat massa in Pilulas iij. dividenda. Sumantur horâ somni.

## Form. 531. PILULÆ HYDRARGYRI OXYMURIATIS.

R. Hydrargyri Oxymuriatis, Ammonia Muriatis, aa gr. v.; Aquæ Destillatæ, f. 3 ss.; Glycyrrhizæ Radicis Pulveris 3 iv.; Mellis Opt. 3 ss. Cogantur in massam, quam divide in Pil. xl.; è quibus sumatur una ter die.

## Form. 532. PIL. HYDRARGYRI PHOSPHATIS COMPOSITÆ.

R. Hydrargyri Phosphatis gr. ix.; Antimonii Tartarizati gr. j.; Opii Crud. in pulv. subtiliss. gr. vj.; Confectionis Fructi Rosæ Caninæ q. s. ut fiat massa, in Pilulas sex æquales distribuenda. Quarum una, horâ decubitûs sumenda.

## Form. 533. PILULÆ HYDRARGYRI ET SCILLÆ.

R. Sodæ Sub-carbon. exsic. 3 ss.; Saponis Duri 3 ij.; Pilul. Hydrarg. gr. xxiv.; Pulv. Scillæ Rad. exsic. gr. xij.; Olei Juniperi q. s. M. Fiant Pilulæ xxiv., quarum capiat unam ter die.

## Form. 534. PILULÆ HYDRARGYRI SUBMURIATIS COMPOSITÆ, SEU PILULÆ PLUMMERI.

R. Hydrargyri Submuriatis 3 ss.; Antimonii Sulphureti Præcipitati 3 j.; Guaiaci Gummi Resinæ contritæ 3 ij.; Saponis 3 ss.; Olei Juniperi, M xxx.; Theriac. Purificat. (Treacle) q. s. ut fiat massa, in Pilulas sexaginta dividenda.

## Form. 535. PILULÆ HYDRIODATIS FERRI.

R. Ferri Hydriodatis gr. xxx.; Croci Stigm. pulveriz. 3 j.; Sacchari Albi 3 iij.; Mucilag. Tragacanth. q. s. Misce. Contunde in massam æqualem, et divide in Pilulas xc.; quarum capiat unam binas vel tres, bis terve quotidie. (Chlorosis, Amenorrhœa, Scrofula, &c.)

## Form. 536. PILULÆ KINO COMPOSITÆ.

R. Kino, 3 ij.; Camphoræ rasæ et subactæ 3 ss.; Oxid. Zinci 3 ss.; Confect. Aromat. 3 j. M. Divide in Pilulas xx. Capiat binas manè nocteque. (AUGUSTIN in Diabetes. Also in Affections of Mucous Surfaces.)

## Form. 537. PILULÆ MORPHINÆ CUM DIGITALE.

R. Acetatis Morphina gr. j.; Pulv. Fol. Digitalis gr. vj.; Camphoræ rasæ gr. x.; Pulv. Acaciæ gr. viij.; Syrup. Tolutan. q. s. Fiat massa æqualis. Divide in Pilulas vj., quarum capiat unam tertiis horis.

## Form. 538. PILULÆ MYRRHÆ ET BALSAMI COMP.

R. Myrrhæ 3 jss.; Benzoini 3 ij.; Balsam. Copaibæ 3 j.; Extr. Glycyrrh. 3 iv. Fiant Pilulæ xlv. secundum artem. Capiat æger binas bis terve quotidie. (Asthma, Chronic Bronchitis.)

## Form. 539. PILULÆ NERVINÆ. (STOLL.)

R. Gummi Ammoniæ, Gummi Assafœtidæ, aa 3 jss.; Saponis Venet. 3 ss.; Pulv. Castorei, Ammonia Carbon., aa gr. xxv.; Mucilag. Acaciæ q. s. M. Fiant Pilulæ lxxx.; è quibus sumantur binæ tertiis vel quartis horis, vel ter die.

## Form. 540. PILULÆ NERVINÆ ANTIMONIATÆ.

R. Gummi Galbani 3 jss.; Gummi Sagapeni, Saponis Venetian., aa 3 j.; Pulv. Rhei 3 ss.; Antimon. Tartarizat. in aqua font. q. s. sol. gr. vj.—x.; Succ. Li-quoritiæ 3 j. Misce. Fiant Pilulæ gr. iij. : sumat unam ad tres ter quotidie.

## Form. 541. PILULÆ NUCIS VOMICÆ.

R. Extr. Res. Nucis Vomicæ 3 ss.; G. R. Assafœtidæ gr. 3 jss. Syrup. q. s. Fiat massa æqualis, et divide in Pilulas xxx. Capiat unam bis terve in die. (Cardialgia Spasmodica, &c.)

## Form. 542. PILULÆ NUCIS VOMICÆ COMPOSITÆ.

R. Morphina Acetatis gr. j.; Ext. Nucis Vomicæ gr. ij.; Olei Olivæ gr. x. Solve; et adde Extr. Rad. Hellebori Nig. (Ed. Ph.) 3 j.; Pulv. Glycyrrh. gr. viij.; Mellis, q. s. Fiat massa æqualis, et divide in Pilulas xij.; quarum capiat unam bis terve in die. (In Chlorosis, Amenorrhœa, &c.)

## Form. 543. PILULÆ CUM OLEO CROTONIS.

R. Pilul. Aloës cum Myrrhâ 3 jss.; Saponis Castil. 3 j.; Olei Crotonis Tiglii M vj.; Pulv. Glycyrrhizæ q. s. M. Fiant Pilulæ xxx. Capiat binas vel tres omni nocte. (In Amenorrhœa.)

## Form. 544. PILULÆ PLUMBI ACETATIS ET DIGITALIS.

R. Plumbi Acetatis gr. iv.; Pulveris Digitalis gr. vj.; Pulveris Opii gr. iij.; Confectionis Rosæ Caninæ, q. s. Misce, et divide in Pilulas sex æquales; quarum sumatur una ter in die.

## Form. 545. PILULÆ PLUMBI ACETATIS ET COLCHICI.

R. Plumbi Acetatis gr. xii.; Pulveris Colchici gr. xxv.; Pulveris Opii gr. iii.; Mucilaginis Acaciæ q. s. Misce optimè, et divide in Pilulas æquales duodecim. (In active Hæmorrhages, in Phthisis, &c.)

## Form. 546. PILULÆ PLUMBI SUPERACETATIS.

R. Plumbi Superacetatis gr. viij.; Opii Crudi pulver. gr. iv.; Confect. Fruct. Rosæ Caninæ q. s. In Pilulas viij. divide. Dosis, j. ij. vel iij. semel, bis sæpiusve in die.

## Form. 547. PILULÆ PURGANTES.

R. Fel. Tauri inspissat., Aloës Extr. Purificat., aa 3 j.; Extr. Colocynth. Comp., Saponis Castil., aa 3 j. M. Fiant Pilulæ xxxvj.

## Form. 548. PILULÆ RHEI RESOLVENTES.

R. Pulv. Rhei, Sodæ Acetatis, Fellis Tauri inspiss. aa 3 ij.; Pulv. Gum. Acaciæ q. s. Fiat massa Pilularis. (Ph. Dan.)

## Form. 549. PILULÆ RHEI BALSAMICÆ.

R. Pulv. Rhei, Pulv. Gum. Acaciæ, aa partes æquales; Balsam. Copaibæ q. s. ut fiat massa pilularis.

## Form. 550. PILULÆ SCAMMONIÆ.

R. G. R. Scammon. gr. xv.; Sacchar. Albi gr. x. Tere probe; deinde adde Ol. Carui M iv. Fiant Pilulæ vj., quarum sumat ij. omni horâ.



## Form. 551. PILULÆ SCILLÆ COMPOSITÆ.

R. Rad. Scillæ recent. 3 ss.; Gum. Ammoniaci, Succ. Glycyrrh., aa 3j.; Sulphur. Antimonii Aur., Pulv. Nucis Myristici, aa 3j.; Syrup. Papaveris q. s. M. Fiant Pilulæ l., quarum capiat binas ad tres ter quaterve in die.

## Form. 552. PILULÆ SCILLÆ CUM IPECACUANHÆ.

R. Scillæ Radicis Pulveris, Zingiberis Radicis Pulveris, aa 3j.; Ipecacuanhæ Radicis Pulv. 3 ss.; Saponis Duri, 3 jss.; Olei Juniperi, ℥ xxx. Contunde, ut fiat massa, in Pilulas lx. dividenda.

## Form. 553. PILULÆ SEDATIVÆ. (1.)

R. Extr. Opii gr. j.; Nitratis Potassæ gr. vj.; Camphoræ rasæ gr. v.; Syrup. Papaver. q. s. ut fiant Pilulæ iij. pro dose.

## Form. 554. PILULÆ SEDATIVÆ. (2.)

R. Camphoræ Subactæ 3 j.; Potassæ Nitratis 3 ss.; Extr. Hyoscyami, Extr. Anthemidis, aa 3j.; Syrup. Papaveris q. s. M. Fiant Pilulæ xxxvj., quarum capiat binas 4tis vel 6tis horis.

## Form. 555. PILULÆ SEDATIVÆ. (3.)

R. Camphoræ rasæ et subactæ gr. x.; Extr. Hyoscyami 3j.; Extr. Papaveris Alb. gr. xij. M. Divide in Pilulas xij., quarum capiat binas vel tres horâ somni.

## Form. 556. PIL. SODÆ CARBONATIS CUM HYOSCYAMO.

R. Camphoræ 3 ss.; (Sp. Rect. q. s. ft. terendo pulv.) Sodæ Carbonatis 3 jss.; Extracti Hyoscyami, 3 ij.; Saponis Duri 3j.; Olei Juniperi ℥ xxx.; Pulveris Irid. Flor. q. s. ut ft. massa, in Pil. xxx. æquales distribuenda; quarum sumat iij. nocte manèque, cum Infus. Lini vel Decoct. Althææ, pro potu communi.

## Form. 557. PILULÆ STAHLII.

R. Peroxid. Antimonii, Aloes Socot., Resin. Guaiaci, aa 3j.; Croci Stig., Myrrhæ, 3 ss.; Bals. Peruv. q. s. ut fiat massa æqualis. Divide in l.

## Form. 558. PILULÆ STOMACHICÆ. (1.)

(*Frank's Grains of Health* : — *Grana Vitæ Mesue*.)

R. Aloes 3 iij.; Mastiches, Petal. Ros. Rub., aa 3j.; Fellis Tauri inspissat. 3 jss. Misce benè; divide in Pilulas c.; quarum capiat ij. vel iij. antè prandium.

## Form. 559. PILULÆ STOMACHICÆ. (2.)

R. Extr. Gentianæ 3 ij.; Fellis Bovinæ inspiss. 3 jss.; Scammonia 3j. Contunde in massam æqualem, et divide in Pilulas lxxx.; quarum capiat binas quotidie, vel primo manè, vel antè prandium.

## Form. 560. PILULÆ STOMACHICÆ. (3.)

R. Limat. Ferri 3 ij.; Pulv. Canellæ 3j.; Fellis Bov. insp. 3 ss.; Syrup. q. s. M. Fiat massa Pilularis. (Chlorosis, &c.)

## Form. 561. PILULÆ STOMACHICÆ. (4.)

R. Limaturæ Ferri 3j.; Pulv. Rhei, Extr. Gentianæ, Fellis Tauri insp. aa 3 iij. M. Fiat massa Pilularis.

## Form. 562. PILULÆ STOMACHICÆ. (5.)

R. Fellis Tauri inspissat., Extr. Aloës purif., Extr. Gentianæ, Saponis Venet., aa 3 ss. M. Fiant Pilulæ xxx., quarum capiat binas bis in die.

## Form. 563. PILULÆ STOMACHICÆ APERIENTES.

R. Ext. Fumariæ Officinalis, Extr. Jalapæ, aa 3j.; Pulv. Capsici Annuj, gr. xvj.; Sodæ Sub-carbon. exsic. 3 ss. Misce secundum artem, et divide in Pilulas xxxvj.; quarum capiat duas vel tres hora et semisse antè prandium.

## Form. 564. PILULÆ STRAMONII.

R. Extracti Stramonii 3j.; Saponis Duri 3 iij.; Acaciæ Gummi pulv. 3j.; Glycyrrhizæ Radicis pulv. 3 ij.; Mucilag. Tragacanth. q. s. ut ft. massa, in Pilulas lx. dividenda. Dosis, j. nocte manèque, vel ter die.

## Form. 565. PILULÆ STRYCHNINÆ.

R. Strychninæ Purif. gr. ij.; Conserv. Rosarum 3j. Misce benè, et divide in Pilulas xxiv.

## Form. 566. PILULÆ STYRACIS COMPOSITÆ.

R. Styracis 3 jss.; Olibani, Benzoini, Croci, Extr. Glycyrrh., Mastiches, aa 3 ss.; Opii Puri 3 ij.; Myrrhæ 3 ij.; Balsam. Tolutan. 3j. Tere benè simul, ut sit massa æqualis. Divide in Pilulas lxxx., quarum capiat unam binas vel tres pro dose. (Each pill contains half a grain of opium.)

## Form. 567. PILULÆ SUDORIFICÆ. (1.)

R. Hydrargyri Protochlorid. (Calomel) gr. xij.; Antimonii Tartarizati gr. jss. ad gr. iij.; Opii Crudi in pulv. subtiliss. gr. vj. Misce; tum adde Confect. Fruct. Rosæ Caninæ q. s. ut ft. massa. In Pilulas vj. æquales divide, quarum capiat j. horâ somni.

## Form. 568. PILULÆ SUDORIFICÆ. (DUMERIL.) (2.)

R. Kermes Mineral. (F. 636), Sulphur. Aurat. Antimonii, aa 3j.; Extr. Opii gr. xij.; Extr. Hyoscyami 3 ij. Divide in Pilulas lx. Capiat j.—ij. bis terve in die.

## Form. 569. PILULÆ SULPHATIS STRYCHNINÆ.

R. Strychninæ Sulphatis gr. ij.; Confect. Rosar. 3j.; Misce probè, et divide in Pilulas xxiv. æquales. Capiat unam pro dose.

## Form. 570. PILULÆ TEREBINTHINATÆ.

R. Gum. Guaiaci 3j.; Terebinthinæ Vulg. 3jss.; Pulv. Glycyrrh. q. s. ut fiant Pilulæ xxxvj., quarum capiat binas vel tres ter quotidie.

## Form. 571. PILULÆ TEREBINTHINÆ ET CAMPHORÆ CUM OPIO.

R. Extr. Opii 3j.; Pulv. Rad. Glycyrrh. 3jss.; tere cum aquæ pauxillo, et adde Terebinth. Venet 3 ij.; Camphoræ rasæ gr. xv.; Croci Stigmata 3j.; Mastiches gr. x.; Pulv. Acaciæ gr. x.; Olei Juniperi q. s. Tere benè simul, et fiat massa æqualis. Divide in Pilulas lx.; quarum capiat binas ad tres bis terve quotidie.

## Form. 572. PILULÆ TONICÆ APERIENTES. (1.)

R. Quininæ Sulphatis 3 ss.—3 j.; Potassæ Sulphatis 3 jss.; Gum. Galbani 3 iv.; Extr. Gentianæ, vel Anthemidis, 3j.; Massæ Pilul. Aloës cum Myrrhâ 3 iij.; Theriacæ Purif. q. s. Contunde in massam æqualem, et divide in Pilulas cxx.; quarum sumantur binæ vel tres, bis terve quotidie.

## Form. 573. PILULÆ TONICO-APERIENTES. (2.)

R. Quininæ Sulphatis 3 j.; Aloës Extr. purif. 3 ss.; Extr. Gentianæ 3j. M. Fiant Pilulæ xxiv., quarum sumat unam vel binas omni meridie.

## Form. 574. PILULÆ TONICÆ APERIENTES. (3.)

R. Ferri Sulphatis 3 j.; Extracti Absinthii (vel Gentianæ), Extr. Aloës Purif., aa 3 jss.; Syrup. Croci q. s. M. Divide in Pilulas lxxxv., quarum capiat binas, tres, quaterve pro dose.

## Form. 575. PILULÆ TONICO-APERIENTES. (4.)

R. Quininæ Sulphatis, Extr. Aloës Purif., aa 3 ij.; Extr. Gentianæ, aa 3 jss.; Syrup. Simp. q. s. Divide in Pilulas xlvij.; quarum capiat duas vel tres pro dose.

## Form. 576. PILULÆ TONICO-APERIENTES. (5.)

R. Quininæ Sulphatis 3 j.; Massæ Pilul. Aloës cum Myrrhâ 3 ij.; Extr. Gentianæ 3j. M. Fiant Pilulæ xxx., quarum capiat binas bis quotidie.

## Form. 577. PILULÆ TONICÆ CUM CUPRO.

R. Cupri Sulphatis gr. x.; Pulv. Rhei 3j.; Extr. Anthemidis 3 ij.; Syrup. Simp. q. s. M. Fiant Pilulæ xl., quarum capiat j. ad iij. (In Leucorrhœa, &c. by AUGUSTIN; and in Gleet, Chorea, &c. The Ammoniated Copper is substituted for the Sulphate in Chorea by NIEMANN.)

## Form. 578. PILULÆ TONICÆ CUM SULPHATE ZINCI.

R. Zinci Sulphatis 3j.; Extracti Gentianæ 3 iv.; Extr. Anthemidis 3 ij. Contunde massam, et divide in Pilulas xl.; quarum sumantur duæ bis die, cum Haustu infra præscripto.

R. Infus. Gentianæ Composit. 3 x.; Acidi Sulphurici Aromat. ℥ xij.; Tincturæ Zingiberis 3j. M. Fiat Haustus.

## Form. 579. PILULÆ TONICO-EMMENAGOGÆ.

R. Quininæ Sulphatis, Massæ Pilul. Galban. Comp., aa 3 ss.; Massæ Pilul. Aloës cum Myrrhâ 3j.; Olei Junip. Sabinæ q. s. M. Divide massam in Pilulas xxx., quarum capiat binas manè nocteque.

## Form. 580. PILULÆ UVÆ URSI ET RHEI.

R. Pulv. Uvæ Ursi, Pulv. Rhei, aa 3 ss.; Saponis Castil. gr. xxv.; Mucilag. Acaciæ q. s. M. Fiant Pilulæ xx.; capiat binas bis quotidie.

## Form. 581. PILULÆ UVÆ URSI ET SODÆ.

R. Pulv. Fol. Uvæ Ursi, Sodæ Sub-carbon exsic., Saponis Duri, aa 3j.; Mucilag. Acaciæ q. s. M. Fiant Pilulæ xl., quarum capiat binas bis terve quotidie.



## Form. 582. PILULÆ VALERIANÆ COMPOSITÆ.

℞ Pulv. Valerianæ gr. xxx.; Castorei gr. xx.; Oxidi Zinci gr. xx.; Syrup. Simp. q. s. M. Fiant Pilulæ xvij., quarum capiat tres ter quotidie. (DUPUYTREN.)

## Form. 583. PILULÆ VALERIANÆ ET ZINCI.

℞ Pulv. Valerianæ ʒ ij.; Castorei gr. xv.; Oxid. Zinci ʒ j.; Olei Cajeputi ℥ v.; Syrup. Simp. q. s. Divide in Pilulas xvij., quarum capiat tres quater in die. (Nearly the same as those used by DUPUYTREN.)

## Form. 584. PILULÆ ZINCI ET MYRRHÆ.

℞ Zinci Sulphatis gr. xij.; Myrrhæ in pulverem tritæ 3 jss.; Confect. Rosæ q. s. ut fiant Pilulæ xxiv.; è quibus sumantur binæ bis quotidie.

## Form. 585. PIL. ZINCI CUM MYRRHA ET IPECACUANHA.

℞ Zinci Sulphatis gr. xij.; Myrrhæ in pulv. trit. 3 j.; Pulv. Ipecacuanhæ gr. xvj.; Extr. Hyoseyami ʒ j. Syrup. Papaveris q. s. M. Fiant Pilulæ xxiv.; è quibus sumatur una ter quaterve quotidie.

## Form. 586. PILULÆ ZINCI SULPHATIS COMPOSITÆ. (1.)

℞ Zinci Sulphatis gr. xij.; Moschi 3 jss.; Camphoræ 3 ss. M. et divide in Pilulas xxxvj., quarum sumantur duæ bis vel ter in die.

## Form. 587. PILULÆ ZINCI SULPHATIS COMPOSITÆ. (2.)

℞ Zinci Sulphatis gr. xij.; Pulv. Ipecacuanhæ gr. vj.; Pulv. Myrrhæ ʒ ij.; Extr. Lactuæ ʒ ijss.; Syrup. Tolutan. q. s. Contunde in massam æqualem, et divide in Pilulas xxiv.

## Form. 588. POTUS ANTIPHLOG. DIURETICUS.

℞ Decocti Asparagi Officin. ℥ ij.; Potassæ Nit. 3 ij.; Spirit. Æther. Nit. 3 ij.; Oxymel. Scillæ 3 ss. Sit pro Potu communi.

## Form. 589. POTUS DECOCTI SARSÆ COMP. (TISANE DE FELTZ.)

℞ Antimonii Sulphureti 3 iv.; Aquæ Com. ℥ xij.; Rad. Sarsaparillæ 3 ij.; Radicis Chinæ Orientalis, Corticis Lig. Buxi, Ichthyocollæ, aa 3 jss.; Oxymuriatis Hydrarg. gr. iij. (Enclose the Antimony in a muslin bag; and boil the whole, excepting the Corrosive Sublimate, until the water is reduced to one half: strain the decoction, and add the Sublimate. The properties of this decoction will not be materially affected by omitting the Radix Chinæ and Cort. Buxi; or Sassafraas or Guaiacum may be substituted, and Extractum Taraxaci added.)

## Form. 590. POTUS DIURETICUS. (1.)

℞ Decocti Tritici Repen. ℥ ijss.; Potassæ Acetat. 3 jss.; Spirit. Æther. Nit. 3 ij.; Aceti Colchici 3 ss.; Vini Xeres 3 vj.; Oxymel. Scillæ 3 jss. Fit pro Potu communi.

## Form. 591. POTUS DIURETICUS. (2.)

℞ Decocti Tritici Repentis O ijss.; Potassæ Supertart. 3 j.; Potassæ Nit. 3 ij.; Sodæ Sub-boracis 3 ij.; Sacchar. 3 iv. Sit pro Potu ordinario.

## Form. 592. POTUS FEBRIFUGUS. (1.)

℞ Potassæ Nitratis 3 ij.; Seri Lactis O ij.; Succo Limonis 3 ijss. M. Sumat pro Potu ordinario.

## Form. 593. POTUS FEBRIFUGUS. (STOLL.) (2.)

℞ Pulpæ Tamarindorum 3 ss. vel 3 vj.; Potassæ Nitratis 3 ij. vel 3 iij.; Seri Lactis O ijss. M. Omni bihorio vasculum coffæanum.

## Form. 594. POTUS MANNÆ ET TAMARINDORUM.

℞ Mannæ, Conserv. Tamarind. Indic., aa 3 jss.; Seri Lactis ℥ jss. Digere et cola. Capiat cyathum subindè.

## Form. 595. POTUS REFRIGERANS.

℞ Acidi Muriatici 3 j.; Spirit. Æther. Nit. 3 iijss.; Decocti Hordei Comp. 3 xxiv. M. Capiat cyathum pro re natâ. (In Febrile Affections.)

## Form. 596. PULVIS ACIDI BENZOINI ET CAMPHORÆ.

℞ Acidi Benzoici gr. vj.; Camphoræ gr. ij.; Sacchari Albi ʒ j. M. Fiat Pulvis. Dispens. tales doses tres. Capiat æger alterâ quâque horâ unum.

## Form. 597. PULVIS ALUMINÆ ET QUININÆ.

℞ Aluminæ Sulphatis gr. viij.—xij.; Quininæ Sulphatis gr. j.—iij.; Gum. Arab., Sacchar. Albi, aa gr. xij. Fiat Pulvis. Dispens. tales duodecim. Capiat æger tertiâ quâque horâ pulverem unum. (In Adynamic Fevers, Hæmatemesis, Passive Hæmorrhages, &c.)

## Form. 598. PULVIS AMMONIARETI CUPRI CUM ZINCO.

℞ Cupri Ammoniareti, Oxydi Zinci, aa gr. ss.—j.; Sacchari Albi gr. x. M. Fiat Pulvis. (Epilepsy and Chorea.)

## Form. 599. PULVIS ANTIHYDROPICUS.

℞ Potassæ Supertart. 3 j.; Potassæ Nitratis, Sub-boracis Sodæ, aa 3 ij.; Pulv. Fol. Digitalis ʒ j. Tere bene simul, et divide in Cartulas xij.; quarum capiat unam bis terve quotidie, in quovis decocto vel infuso.

## Form. 600. PULVIS ANTIMONII ET CAMPHORÆ.

℞ Sulph. Aurat. Antim., Radicis Ipecacuanhæ, aa gr. j.; Camphoræ rasæ gr. j.—iij.; Sacchari Albi 3 j. M. Pulv. Dispens. tales doses sex: sumat æger alterâ quâque horâ Pulverem unum. (In Chronic Inflammations of the Respiratory Organs.)

## Form. 601. PULVIS ANTIMONIALIS COMPOSITUS.

℞ Pulveris Antimonialis 3 v.; Antimonii Sulphureti præcipit. 3 j. M. Dosis gr. v. pro ætate adultâ.

## Form. 602. PULVIS ANTIPHLOGISTICUS.

℞ Potassæ Nitratis 3 iij.; Potassæ Tartratis 3 ivss.; Acidi Boracici 3 j. Tere in pulv. subtiliss. (In doses of 3 ss. in Cutaneous Affections, &c.)

## Form. 603. PULVIS ANTISPASMODICUS. (STAHLII.)

℞ Kermes Mineral. gr. j.; Potassæ Nitratis, Potassæ Sulphatis, aa gr. x. Misce benè.

## Form. 604. PULVIS APERIENS.

℞ Pulveris Jalapæ 3 iij.; Submuriatis Hydrargyri 3 j.; Pulveris Zingiberis 3 ij. Misce. Dosis, à gr. iv. ad gr. xx.

## Form. 605. PULVIS ASARI COMPOSITUS.

℞ Asari Folior. exsiccât. 3 iij.; Origanii Folior. exsiccât., Lavandulæ Florum exsiccât., aa 3 j. Sunul terentur, et fiat Pulvis. (In Chronic Ophthalmia and Tooth-ach, as a sternutatory, &c.; to produce a secretion from the Schneiderian membrane.)

## Form. 606. PULVIS BELLADONNÆ.

℞ Pulv. Rad. Belladonnæ gr. iv.; Pulv. Rad. Glycyrrh. et Sacchar. Albi, aa gr. xxvij. Tere benè simul. Dosis gr. iv.—xx., bis in die.

## Form. 607. PULVIS BELLADONNÆ COMPOSITUS.

℞ Pulv. Rad. Belladonnæ gr. vj.; Pulv. Ipecacuanhæ gr. vj.; Pulv. Rad. Glycyrrh., Pulv. Sacchar. Albi, aa 3 ss.; Sulphur. Præcipit. ʒ ij.; Olei Anisi, Olei Succini, aa ℥ iij. Misce. In dosis gr. v.—xx.

## Form. 608. PULVIS BELLADONNÆ COMPOSITUS. (HECKER.)

℞ Pulv. Fol. Belladonnæ gr. j.—iij.; Moschi, Camphoræ, aa gr. v.; Sacchar. Albi 3 ss. Tere benè, et divide in Cartulas viij. (Antispasmodic. Pertussis, &c.)

## Form. 609. PULVIS BISMUTHI.

℞ Bismuthi Sub-nit. gr. j.; Magnes. Calcinat., Sacchar. Albi, aa gr. x. M. Fiat Pulvis; tertiâ vel quartâ quâque horâ sumendus. (ODIER.)

## Form. 610. PULVIS BISMUTHI COMPOSITUS.

℞ Bismuthi Sub-nitrat., Moschi, aa gr. j.; Extr. Hyoscyami gr. ss.; Magnes. Sub-carbon. gr. v. M. Fiat Pulvis, tertiâ quâque horâ sumendus. (MARCUS.)

## Form. 611. PULVIS BORACIS ET SABINÆ.

℞ Pulveris Foliorum Sabinæ, Pulv. Zingiberis, aa gr. vij.; Sodæ Boracis ʒ j. Fiat Pulvis, bis die sumendus. (In Amenorrhœa with a languid pulse.)

## Form. 612. PULVIS CALOMELANOS CUM DIGITALE.

℞ Hydrargyri Submuriatis, Sacchari Albi, aa 3 j.; Pulveris Digitalis 3 ss. Misce. Dosis, à gr. j. ad gr. v.

## Form. 613. PULVIS CALUMBÆ COMPOSITUS.

℞ Pulveris Calumbæ 3 j.; Pulv. Rhei 3 ss.; Sodæ Sub-carbonatis 3 iijss. Misce. Dosis, à gr. vj. ad 3 ss. bis de die.



## Form. 614. PULVIS CAMPHORÆ.

- R Camphoræ 3 ss.; Sp. Rectif. q. s. Ft. terendo pulv.; dein adde, Sacchari Purificat. 3 j.; Pulv. Acaciæ 3 jss. M. Fiat Pulvis, et in cart. x. æqualis distribuendus.

## Form. 615. PULVIS CAMPHORÆ ET ZINCI.

- R Camphoræ rasæ 9 j.; Zinci Oxidi gr. xv. M. In Cartulas iv. distribue; quarum sumat unam horâ somni. (In Epilepsy supervening about puberty, and connected with venereal desires and indulgences.)

## Form. 616. PULVIS CARMINATIVUS. (1.)

- R Magnes. gr. viij.; Seminum Anisi contus., Seminum Fœniculi cont., ȳa gr. ij.; Croci gr. j.; Sacchari Albi gr. viij. Contunde bene simul, et sit pulvis. Capiat dididium statim, et alterum post horam. (For the Termina of infants, &c.)

## Form. 617. PULVIS CARMINATIVUS. (2.)

- R Magnes., Sacch. Albi, ȳa 3 j.; Pulv. Corticis Cannelle, Semin. Fœniculi cont. gr. xx.; Olei Anisi ȳ viij. Tere benè simul, et divide in Cartulas xij.; quarum capiat unam bis terve quotidie, vel urgent. torminibus.

## Form. 618. PULVIS CARMINATIVUS. (3.)

- R Sem. Anisi, Sem. Carui, Sem. Coriand., Sem. Fœniculi, ȳa 3 j.; Cort. Auran., Rad. Zingib., ȳa 3 vj.; Cretæ Præpar. 3 jss.; Magnes. 3 ss.; Macis 3 jss.; Sacchar. Alb. 3 ij.; tere benè simul. Dose, 3 j.—3 ij.

## Form. 619. PULVIS CATHARTICUS.

- R Submuriatis Hydrargyri, Pulveris Cambogiæ, Pulv. Jalapæ, Pulv. Rhei, Pulv. Cinnamomi, ȳa 3 ij. Misce. Dosis, à gr. v. ad 9 j.

## Form. 620. PULVIS CINCHONÆ COMPOSITUS.

- R Pulv. Cinchonæ 3 jss.; Pulv. Mosch. gr. xv.; Camphoræ 9 j.; Ammoniac Carbon. gr. xxv.; Olei Succini et Olei Menthæ ȳa ȳ vj. Misce probè, et divide in Pulv. viij.

## Form. 621. PULVIS CINCHONÆ CUM SODA.

- R Pulveris Cinchonæ, Sodæ Subcarbonatis, ȳa partes æquales. Dosis, à gr. v. ad 9 ss. bis terve in die.

## Form. 622. PULVIS CORTICIS CUSPARIÆ COMP.

- R Pulv. Cort. Cuspariæ gr. x.; Cinnam. Comp. gr. vj.; Olei Pimentæ ȳ j. M. Fiat Pulvis, ter de die capiendus.

## Form. 623. PULVIS CRETÆ ET RHEI COMPOSITUS.

- R Cretæ Præpar. 3 ss.; Saponis Amygdal., Pulv. Rhei, ȳa 3 j.; Hydrarg. cum Cretâ 9 j.; Olei Fœniculi ȳ viij.; Sacchar. Albi 3 ij.; tere benè simul. Capiat gr. vj. ad 3 ss. pro dose bis vel ter die. (Pro Infantum Diarrhœa.)

## Form. 624. PULVIS CRETACEUS.

- R Cretæ Preparatæ, Acaciæ Gummi Ver. pulv., ȳa 3 iv.; Sacchari Purificati contriti, 3 iij. Misce. Ft. Pulvis.

## Form. 625. PULVIS CYANURETI ZINCI.

- R Zinci Cyanureti gr. vj.; Magnesiae Calcinatæ gr. iv.; Pulvis Cinnamomi, gr. iv. M. Fiat Pulvis, quartâ quâque horâ sumendus. (In Gastrodynia, Dysmenorrhœa, Dyspepsia.)

## Form. 626. PULVIS DEOBSTRUENS.

- R Gum. Guaiaci 3 ij.; Flor. Sulphur. 3 jss.; Calomelanos 9 j.; Radicis Ireos Flor., Semin. Fœniculi, ȳa 3 jss.; Opii Extr. gr. ij.; Sacchar. Albi 3 ss. Tere benè simul, et divide in Pulv. vj.

## Form. 627. PULVIS DIURETICUS. (1.)

- R Potassæ Nit., Potassæ Supertart., ȳa 9 iv.; Pulv. Scillæ gr. viij.; Pulv. Zing. gr. xvj. Misce benè, et divide in Cartulas viij.

## Form. 628. PULVIS DIURETICUS. (2.)

- R Potassæ Supertart. 3 jss.; Pulv. Scillæ exsic. gr. ij.; Pulv. Digitalis gr. j.; Pulv. Zingiberis gr. v. Fiat Pulvis, ter quaterve quotidie sumendus ex theriacâ.

## Form. 629. PULVIS ECCOPROTICUS.

- R Potassæ Supertart. 3 j.; Magnes. Sub-carbon., Flor. Sulphur., ȳa 3 ss.; Potassæ Nit. 3 ij. Misce, et divide in Cart. vj. (In Hæmorrhoids, &c.)

## Form. 630. PULVIS ECPHRACTICUS. (1.)

- R Potassæ Supertart. 3 ss.; Sodæ Sub-boratis, Magnesiae Sub-carbon., ȳa 3 ij.; Pulv. Flor. Anthemidis, Pulv. Semin. Fœniculi, ȳa 3 ij.; Sacchari Albi 3 ss.; Olei Juniperi, et Ol. Anisi, ȳa ȳ xv. Tere benè simul. Capiat 3 j.—3 ij. bis terve quotidie.

## Form. 631. PULVIS ECPHRACTICUS. (SELLI.) (2.)

- R Magnes. Sub-carbon., Potassæ Supertart., Sulphur. Sublimati, Pulv. Rhei, Pulv. Flor. Anthemid., Pulv. Seminum Fœniculi (vel potiùs Sacchari Albi 3 ss.; Olei Fœniculi Dul. ȳ xxiv.), ȳa 3 ss.; Olei Juniperi ȳ xvij. Tere benè simul. Capiat 3 j.—3 ij. bis terve quotidie ex vehiculo quovis idoneo. (In Obstructions, Jaundice, Piles, &c.)

## Form. 632. PULVIS EXCITANS.

- R Boracis Sodæ gr. xv.—9 j.; Pulv. Sabinæ gr. vj.; Pulv. Castorei, Pulv. Rad. Zingib. ȳa gr. x. M. Fiat Pulvis. Sumat ægra de die Pulveres binos in vino vel cum melle. (Stimulans et emmenagogus in Menstruorum defectu ex Leucophlegmasiâ. HARTMANN.)

## Form. 633. PULVIS INFANTILIS.

- R Rhei Radicis Pulveris 3 ij.; Magnesiae Sub-carbonatis 3 x.; Zingiberis Rad. Pulv. 3 ss. M. Fiat pulvis. Capiat gr. vj. ad 3 ss. pro dose.

## Form. 634. PULVIS IPECACUANHÆ CUM CALOMELANE.

- R Hydrargyri Sub-muriatis 3 j.; Pulv. Ipecacuanhæ 3 ij.; Pulv. Cinnamomi 3 jss.; Sacchari Albi 3 iijss. M. Dosis, à gr. ij. ad gr. x.

## Form. 635. PULVIS JALAPÆ COMPOSITUS.

- R Jalapæ Radicis Pulveris 3 j.; Potassæ Super-tartratis 3 ij.; Capsici Baccarum Pulv. gr. xij. Omnia, seor. sim trita, permisce. Dosis à 3 ss. ad 3 j. manè.

## Form. 636. PULVIS JALAPÆ ET CALOMELANOS.

- R Pulv. Rad. Jalapæ gr. xv.—xx.; Hydrarg. Submur. gr. ij.; tere probè cum Sacchar. Alb. 3 ss.; et adde Pulv. Acaciæ 9 j.; Ol. Carui ȳ ij. M. Fiat Pulvis, statim sumendus.

## Form. 637. PULVIS KERMES MINERALIS. (Hydro-Sulphuret of Antimony. BERZELIUS.)

- R Aquæ Pluvial. part. 280; Sub-carbon. Sodæ part. 128; Sulphureti Antimonii pulver. part. 6. Dissolve the Soda in the water whilst boiling; and boil the Sulphuret in the solution for half an hour, stirring it frequently. Filter the boiling liquor in a vessel containing warm water which had been previously boiled. Decant the water after it is cooled. Wash the precipitate which is formed, first with cold water, afterwards with warm water, until it passes off quite insipid. Lastly, press it, and dry it in the shade. (Stimulant, Emetic, Diaphoretic, Alterative, Becchic, Expectorant. Dose j.—iv. gr.)

## Form. 638. PULVIS KERMES MINERALIS ET CAMPHORÆ.

- R Kermes Mineral. gr. ij.; Camphoræ Subact. in Pulv. gr. iij.; Potassæ Nit. gr. v.—xij. M.

## Form. 639. PULVIS KERMES MINERALIS CAMPHORATUS.

- R Kermes Mineral. gr. iij.; Camphoræ Pulverizat. gr. viij.; Potassæ Nitratis gr. xxiv.; Sacchar. Albi 3 ss. Tere benè, et divide in Pulv. iv. Capiat unam, quater in die.

## Form. 640. PULVIS LENITIVUS HYPOCHONDRIACUS. (KLEIN.)

- R Flavedinis Cort. Aurant., Radicis Rhei, Potassæ Tartratis, ȳa 3 ss.; Olei Cajeput. ȳ iij. M. Ft. Pulvis pro unâ dose.

## Form. 641. PULVIS LIENTERICUS.

- R Pulveris Tragacanth. Comp., Pulv. Rhei, ȳa 3 iij.; Pulv. Ipecacuanhæ comp. 3 j.; Hydrargyri cum Cretâ 3 j. Misce. Dosis, à gr. v. ad 3 ss. 3tiis, 4tis, vel 6tis horis. Interdum adde Extract. Catechu, &c.

## Form. 642. PULVIS NITRO-OPIATUS IPECACUANHÆ, vel PULVIS DOVERI.

- R Ipecacuanhæ Radicis contritæ 3j.; Opii Crudi contriti gr. xlv.; Potassæ Nitratis 3 viij. et gr. xv.



Tere simul, et fiat pulvis. (A scruple of this powder contains one grain and a half of opium, two grains of ipecacuan, and sixteen grains and a half of nitrate of potass.)

## Form. 643. PULVIS PURGANS.

- R Hydrarg. Sub-mur., Cambog. G. R. pulveriz., Pulv Zingiberis, aa 3 ss.; Sacchar. Purif. ʒj. Tere benè simul; et adde Olei Fœniculi Dulcis ℥ xx. Dosis gr. v. ad xv.

## Form. 644. PULVIS REFRIGERANS. (1.)

- R Acidi Boracici 3 ss.; Potassæ Nitratis 3 j.; Potassæ Supertart. 3 ij. Misce benè. Capiat ʒj.—3 j. pro dose.

## Form. 645. PULVIS REFRIGERANS. (2.)

- R Potassæ Supertartratis pulverizati uncias duas; Nitratidrachmastres. Misce, et divide in partes xij. æquales.

## Form. 646. PULVIS RESOLVENS, VEL DEOBSTRUENS.

- R Potassæ Supertartratis pulverizati 3 ivss.; Sodæ Sub-boracis 3 jss.; Antimonii Tartarizati gr. iij. Misce probè, et divide in partes æquales viginti.

## Form. 647. PULVIS RHEI COMPOSITUS.

- R Pulvis Rhei 3 iijss.; Hydrargyri cum Cretâ 3 j.; Potassæ Subcarbon. 3 jss.; Pulv. Cinnamonomi 3 ss. Misce. Dosis, à gr. v. ad ʒj. bis vel ter die.

## Form. 648. PULVIS RHEI ET MAGNESIÆ.

- R Pulv. Rhei ʒj.—3 ss.; Magn. Sub-carb. gr. xvj.—3 ss.; Semin. Fœniculi, Sacchari Albi, aa gr. x.; Olei Cassiæ Cinnam. ℥j. M. Fiat Pulvis.

## Form. 649. PULVIS RHEI ET SULPH. POTASSÆ.

- R Pulv. Rhei gr. vj.—x.; Potassæ Sulphatis gr. x.—ʒj.; Pulv. Sem. Anisi gr. vj.; Olei Fœniculi ℥j. M. Fiat Pulvis, bis terve quotidie sumendus.

## Form. 650. PULVIS SCAMMONIÆ CUM CALOMEL. (1.)

- R Scammon. Gum. Resinæ pulv. 3 ij.; Hydrarg. Submur. (Calomel), Sacchari Purificati, aa 3 j. M. Fiat Pulvis. Dosis gr. x. ad gr. xx. manè.

## Form. 651. PULVIS SCAMMONIÆ CUM CALOMEL. (2.)

- R Scammon. Gummi Resinæ pulv., Hydrarg. Protochlorid. (Calomel), Potassæ Supertart., aa 3 ij. Misce benè simul, et sit Pulvis.

## Form. 652. PULVIS SCAMMONIÆ ET JALAPÆ.

- R G. R. Scammoneæ gr. xij.; Pulv. Rad. Jalapæ gr. xvij.; Potassæ Supertart. gr. xxv. Tere probè in pulverem tenuissimum; dein adde Pulv. Zingiberis gr. viij.; divide in partes tres æquales, quarum sumat j. secunda vel tertia q. q. hora, donec plenè dejecerit alvus.

## Form. 653. PULVIS SEDATIVUS.

- R Hydrarg. cum Cretâ 3 j.; Pulv. Ipecacuanhæ Comp. ʒij.; Magnes. Carbon 3 ss. Tere benè simul. Dosis gr. iv.—xij., pro Infantibus.

## Form. 654. PULVIS SENEGÆ ET CAMPHORÆ.

- R Pulv. Rad. Senegæ, Sacch. Alb., aa gr. xij.; Camphoræ rasæ gr. ij. M. Fiat Pulvis. Dispensentur tales doses tres. Capiat æger, interjectis duabus horis, pulverem unum. (In Chronic Affections of the Chest.)

## Form. 655. PULVIS SODÆ COMPOSITUS.

- R Sodæ Sub-carbon. exsicc. 3 vj.; Hydrargyri Submuriatis 3 j.; Pulv. Cretæ comp. 3 j. Misce. Dosis, à gr. v. ad ʒj.

## Form. 656. PULVIS SODÆ CUM HYDRARGYRO.

- R Sodæ Sub-carbon. exsic. 3 iv.; Hydrarg. cum Cretâ 3 ij. Misce benè. Dosis, gr. vj.—ad gr. xij. pro Infantibus bis quotidie.

## Form. 657. PULVIS SPECIFICUS STOMACHICUS. (POTERII.)

- R Protoxid. Ferri, Antimon. Crud., aa partes æquales vel unam; Potassæ Nitr. part. vj. Detona seu deflagra, et lava.

## Form. 658. PULVIS SULPHATIS POTASSÆ ET FERRI.

- R Ferri Sulphatis 3 vj.; Potassæ Sulphatis 3 xij. Tere benè simul, et adde Acidi Sulphurici ℥ xxxvj. M. Dosis ʒj.—3 jss. bis, ter, quaterve in die.

## Form. 659. PULVIS SULPHATIS QUININÆ ANTIMONIATI.

- R Quininæ Sulphatis gr. xij.; Antimonii Tartarizat. gr. ij. Misce benè, et divide in partes vj. æquales. Capiat unam 2dis vel 3tiis horas inter paroxysmos.

## Form. 660. PULVIS SULPHATIS QUININÆ ET MORPHIÆ.

- R Quininæ Sulphatis gr. iv.—xij.; Morphinæ Sulphatis, gr. j—ij. Misce, et divide in dos. iv. vel vj.

## Form. 661. PULVIS SULPHURET. AUREAT. ANTIMONII, VEL DEUTO-SULPHURET. ANTIM. (BERZELIUS.)

- R Liquoris restantis post præcipitat. Mineralis Kermes dict. quantum velis; infunde Acid. Acetici quantum sufficiat, vel donec nil amplius præcipitationis appareat. Lave benè materiam præcip. et exsicca. (N. B. the Precipitated Sulphuret of Antimony of the Lond. Ph. is an admixture of Kermes Min. and the Golden Sulph.)

## Form. 662. PULVIS TONICUS.

- R Ferri Sulphatis exsiccati 3 iij.; Potassæ Sulphatis 3 ij.; Pulveris Cascariellæ 3 iijss. Misce. Dosis, à gr. ij. ad gr. x. bis terve in die.

## Form. 663. PULVERES TONICÆ.

- R Pulv. Cinchonæ, Extr. Glycyrrh., aa 3 iij.; Pulv. Rad. Valerian. ʒij.; Sacchar. Albi 3 ss. Tere benè simul, et divide in Cartulas ix. Capiat unam ter quotidie. (HELLER and NIEMANN.)

## Form. 664. PULVERES TONICO-APERIENTES.

- R Pulv. Cinchonæ 3 j.; Pulv. Rhei 3 iijss.; Ammoniaæ Muriatis 3 jss. Misce benè, et divide in Cartulas xij. (BANG et JADELLOT.)

## Form. 665. PULVIS VALERIANÆ ET ZINCI.

- R Valerianæ Pulv. 3 j.; Oxid. Zinci ʒj.; Moschi, Sacchari Purif., aa gr. x.; Olei Cajeputi ℥ xii. Tere simul, et divide in Cartulas vj.; quarum capiat unam ter die.

## Form. 666. PULVIS ZINCI OXYDI COMPOSITUS.

- R Oxydi Zinci gr. xij.; Magnes. Calcinatæ 3 ss.; Pulv. Calumbæ 3 j. Tere benè simul, et divide in Cartulas xij.; quarum capiat unam ter quaterve in die. (DE HAEN.)

## Form. 667. PULV. ZINCI SULPHATIS COMP.

- R Myrrhæ G. R. 3 j.; Pulv. Ipecac. gr. vj.; Zinci Sulphatis gr. vj.; Pulv. Glycyrrh., Sacchar. Albi, aa 3 jss.; Tere optimè simul ut fiat Pulvis. Divide in Cartulas ix., quarum capiat unam ter quaterve in die ex the-riacâ.

## Form. 668. SAPO OLEI CROTONIS TIGLIÆ.

- R Olei Crotonis Tiglii partes ij.; Lixivii Saponarii pars j. Contere, et fiat Sapo. Dosis gr. ij. vel iij.

## Form. 669. SAPO TEREBINTHINÆ.

- R Potassæ Causticæ 3 j.; Liquefac lento igne, et adjice Olei Terebinthinæ 3 iij. Misce benè donec refrixerat, (Used both externally and internally.)

## Form. 670. SAPO TEREBINTHINATA.

- R Saponis Castil. 3 j.; Olei Terebinthinæ 3 iijss.; adde Solutioni Potassæ Sub-carbon. 3 ij.; Camphoræ-rasæ ʒij. Misce benè. (Used externally and internally.)

## Form. 671. SOLUTIO IODINÆ. (LUGOL.)

- |                     |        |           |          |
|---------------------|--------|-----------|----------|
|                     | No. 1. | No. 2.    | No. 3.   |
| R Iodinæ            | -      | -         | -        |
| Potassæ Hydriodatis | -      | gr. ij.   | gr. iij. |
| Aquæ Destil.        | -      | gr. iv.   | gr. vj.  |
|                     | -      | gr. viij. | gr. x.   |
|                     | -      | ℥j.       | ℥j.      |
|                     | -      | ℥j.       | ℥j.      |
- Solve. (Chiefly for external use; for injections in Scrofulous Fistulæ, &c.)

## Form. 672. SOLUTIO IODINÆ CAUSTICA. (LUGOL.)

- R Iodinæ 3 j.; Potassæ Hydriodatis 3 j.; Aquæ Destillatæ 3 ij. Solve.

## Form. 673. SOLUTIO IODINÆ RUBEFACIENS. (LUGOL.)

- R Iodinæ 3 iv.; Potassæ Hydriodatis 3 j.; Aquæ Destillatæ 3 vj. Solve.



## Form. 674. SOLUTIONIS MURIATIS MORPHINÆ.

R Muriatis Morphinæ gr. x.; Aq. Destillat. Calid. ℥ 1000. Solve. (Dose twenty-five minims—equal to  $\frac{1}{4}$  of the Muriate.)

## Form. 675. SOLUTIO SULPHATIS MORPHINÆ.

R Sulphatis Morphinæ Ver. gr. iv.; Aquæ Destillatæ 3j.; Solve. (Of the same strength as Laudanum.)

## Form. 676. SPIRITUS ÆTHERIS MURIATICI.

(*Olim, Spiritus Febrifug. Cluttoni.*)

R Acidi Sulphurici, ℥ j. 3 xij. (per pond.); Acidi Muriatici ℥ j. (per pond.); Spiritus Rectificati cong. j. Distilletur liquor, secundum artem.

## Form. 677. SPIRITUS AMMONIÆ ANISATUS.

(*Ph. Cont. Omn.*)

R Olei Anisi 3iij.; Spirit. Ammonia 3vj. Solve.

## Form. 678. SPIRITUS CASTOREI AMMONIATI.

R Castorei contr. 3iij.; Croci Stigm. 3j.; Herb. Artemisia 3vj.; Potassæ Sub-carbon. 3ij.; Spirit. Tenuior. 3xxx. Macera per dies vj. et cola. Dein adde Spirit. Ammonia, Liquoris Ammonia, aa 3vj. M. Dosis 3j.—3ij.

## Form. 679. SPIRITUS CASTOREI COMP.

R Castorei contr. 3iij.; Croci Stigm. 3j.; Herb. Artemisia 3vj.; Spirit. Tenuior. ℥ ijss. Macera per dies sex, et cola. Deinde adde Olei Anisi, Olei Juniperi, Olei Rutæ, aa 3j. M. Dosis 3ss.—3jss. 3tiis vel 4tis horis.

## Form. 680. SPIRITUS TEREBINTHINATUS.

R Olei Terebinthinæ 3jss.; Spirit. Vini Rect. 3vj. Distilla leni cum calore. Dosis in ℥ vj.—xx. (In Jaundice.)

## Form. 681. SPIRITUS TEREBINTHINATUS COMP.

R Saponis Albi 3ij.; Opii 3ss.; Spirit. Vini Junip. (vulgò Hollandii) 3xijss.; Spirit. Terebinth. Rect. 3iv.; Camphoræ 3vj. Macera benè, et cola. (Externally as a Liniment; and internally in Colics and Nephritic Complaints, in doses of from 10 to 20 drops, and in Dropsies.)

## Form. 682. SUPPOSITORIUM OPIATUM.

R Opii Puri gr. ij.; Saponis Duri Hisp. gr. iv. Simul contunde, et fiat massa pro Supposito.

## Form. 683. SUPPOSITORIUM PLUMBI COMPOSITUM.

R Emplastrum Plumbi part. viij.; Abietis Resinæ cont. part. ij.; Opii Puri pulveriz. part. ss.—j. Solve emplastrum et resinam; deinde adde Opium, et forma in Supposit.

## Form. 684. SYRUPUS BELLADONNÆ.

R Fol. Belladonnæ 3ij.; Rad. Bellad. 3j.; Sacchar. Albi ℥ j. Aquæ q. s. ut sit decoctio ℥ j.

## Form. 685. SYRUPUS MORPHINÆ ACETATIS.

R Morphinæ Acetatis gr. iv.; Syrupi Clarificati 3xvj. Misce ut fiat Syrupus. (In doses of from two tea-spoonsful to a table-spoonful every three hours, or only at bed-time.)

## Form. 686. SYRUPUS MORPHINÆ SULPHATIS.

R Morphinæ Sulphatis gr. iv.; Syrupi Clarificati 3xvj. Misce. (In the same doses as the Acetate. May be given alternately with the Acetate.)

## Form. 687. SYRUPUS PAPAVERIS.

R Extracti Papaveris Veri (in vacuo præp.) 3j. Solve in Aquæ Destillatæ Ferventis Oj.; cola, et adde Sacchari Purificati ℥ ijss.

## Form. 688. SYRUPUS POTASSÆ SULPHURETI.

R Sulphureti Potassæ 3j.; Aquæ Hysopi vel Fœniculi 3ij. Solve, et adde Sacchar. Albi 3iv.; et macera in Baln. Aren.

## Form. 689. SYRUPUS QUININÆ.

R Syrupi Simplicis 3viij.; Quininæ Sulphatis gr. xxxij. Capiat Cochlear. ij. minima, bis terve de die.

## Form. 690. SYRUPUS RHEI COMPOSITUS.

R Rad. Rhei concis. et contus. 3iij.; Fol. Sennæ 3ij.; Canellæ Corticis cont. 3ss.; Semin. Fœniculi cont. 3j.; Potassæ Sub-carbon. 3ij.; Rad. Zing. concis. 3j.; Aquæ Ferventis ℥ ij. Macera per horas viginti quatuor loco in calido, et cola. Liq. colati adde Mannæ 3ij.; Sacch. Purif. ℥ ijss. Fiat Syrupus.

## Form. 691. SYRUPUS SENNÆ ET MANNÆ.

R Fol. Sennæ 3iv.; Semin. Fœniculi cont. 3jss.; Sem. Anisi cont. 3iij.; Radicis Zingiberis 3jss.; Aquæ Ferventis Oij. Digere per horas quatuor; exprime et cola. Dein colaturæ adde Mannæ Optimæ 3vj.; Sacchari Albi 3xxij.; et fiat Syrupus.

## Form. 692. SYRUPUS SULPHURETI SODÆ.

R Sodæ Puræ (cum Alcoh. præp.) 3j.; Aq. Destillat. 3v.; Liquefac leni igne, et adde Sulphur. Puri quantum solveri potest. R Liquoris 3j.; Syrup. Communis 3xxxj. Misce benè in vase benè obturato. (Doses of 3j.—3ij. for infants, 3j.—3iij. for adults.)

## Form. 693. TINCTURA ACETATIS FERRI COMP.

R Acetatis Plumbi 3ss.; Ferri Sulph. 3iij.; Aceti, Alcoholis, aa 3ij.; Aq. Rosar. 3vj. Solve Acet. Plumbi in aceto cum leno igne; dein adde Sulph. Ferri in Pulv., cujus, post solutionem, infunde Alcohol. cum Aq. Rosar. permistum.

## Form. 694. TINCTURA ACETATIS MORPHINÆ COMPOSITA.

R Morphinæ Acetatis gr. xvj.: solve in Aquæ Destil. 3iij.; Acidi Acetici ℥ v.; Spirit. Lavandul. Co. f. 3vj.; Spirit. Myristicæ, vel Tinct. Cinnamom. Comp. 3vij. M. Dosis ℥ x.—3j.

## Form. 695. TINCTURA ÆTHEREA VALERIANÆ.

R Radicis Valerian. pulver. 3j.; Ætherici Sulphurici non-rectificat. 3vj.; Alcohol. rectific. 3j. Macera per triduum et cola.

## Form. 696. TINCT. ALOETICA ALKALINA. (SAXON PH.)

R Croci Stigmat. in pulv. pars j.; Aloës Socot. in pulv. part. jss.; Myrrhæ pulv. part. ij.; Sub-carb. Potassæ part. iv. Misce, et pone in locum humidum ut deliquescat; dein infunde Aquæ Ferventis part. xij. Macera per horas duodecim, et adde Alcoholis Concent. part. duodecim. Digere leni cum calore per dies tres, et cola. In dos. 3ss.—3jss.

## Form. 697. TINCTURA ALKALINA POTASSÆ.

R Potassæ Causticæ 3ss.; Alcoholis Concent. 3iv. Macera per dies septem in balneo arenario.

## Form. 698. TINCTURA ALKALINA STIBIATÆ.

R Antimonii Crudi 3j.; Potassæ Sub-carbon. 3ij. Melt in a crucible, and reduce them to yellowish scoriæ; then powder them immediately in a hot iron mortar, and pour upon them rectified Alcohol 3vj. Macerate for three days, and filter.

## Form. 699. TINCTURA AMARA.

R Aloës Socot. 3iv. vel v.; Gum. Myrrhæ, Mastiches, Benzoës, Rad. Calumbæ concis. aa 3ij.; Rad. Gentianæ 3jss.; Croci Stigm. 3j.; Spirit. Vini Gallicæ (Brandy) ℥ ix.; Spirit. Vini Hollandiæ (Hollands) ℥ ij. Macera per mensem, et cola. (The celebrated "Droge Amère" of the Jesuits, and an excellent tonic and aperient.)

## Form. 700. TINCTURA AMMONIACI ALKALINA.

R Gummi Ammoniaci 3iij.; Liq. Potassæ Sub-carbon. 3ijss.; Myrrhæ 3j.; Alcoholis Oj. Macera per dies septem, et cola. Dosis 3ss.—3jss.

## Form. 701. TINCTURA BALSAMICA. (1.)

R Olei Terebinthinæ 3j.; Tinct. Myrrhæ 3ij.; Tinct. Benzoini Comp. 3iv. Macera in loco calido. (Internally, and to Indolent Sores, &c.)

## Form. 702. TINCTURA BALSAMICA. (2.)

R Balsam. Tolutan. 3ss.; Balsam. Peruvian., Styracis Balsam., Flor. Benzoës, Myrrhæ, aa 3iij.; Croci Stigmat. 3ij.; Spirit. Vini rect. 3xx. Macera per dies tres, et cola. (*Wirtenburgh Ph. nearby.*)



## Form. 703. TINCTURA BALSAMI TOLUTANI.

- R Balsami Tolutan. 3 j.; Semin. Anisi cont. 3 j.; Flor. Benzoës 3 ss.; Spirit. Rectificat. O j. Digere, donec solvatur Balsamum; dein cola.

## Form. 704. TINCTURA BELLADONNÆ.

- R Belladonnæ Foliorum exsiccatorum 3 ij.; Spiritus Tenuioris O j. Macera per dies quatuordecim, et cola.

## Form. 705. TINCTURA BENZOICA ANODYNA.

- R Camphoræ rasæ 3 jss.; Ipecacuanhæ, Balsam. Tolutan., aa 3 ss.; Acidi Benzoïni aa 3 ij.; Opii Puri, Croci Stigm., 3 iijss.; Olei Anisi 3 j.; Spirit. Vini Ten. 1b ij. Macera benè, et cola. Dosis ʒj. —xxx. (The Tinct. Opii Benzoica Compos. of the AUST. PHAR. and Tinct. Anodyno-Sudorific. of various foreign Pharmacopœias.)

## Form. 706. TINCTURA BRUCINÆ.

- R Brucinæ Puræ gr. xij.; Alcoholis (s. g. 837) f. 3 j. Solve. (3 j. contains gr. jss. of Brucine. Dose 3 ss. —3 ij.)

## Form. 707. TINCTURA CALAMI.

- R Calami Radicis contusi 3 iv.; Spiritus Tenuioris O ij. Macera per dies quatuordecim, et per chartam cola.

## Form. 708. TINCTURA CAMPHORÆ THEBAICÆ.

- R Opii Pulveriz. 3 iij.; Camphoræ 3 vj.; Corticis Canellæ contus., Croci Stigmat., aa 3 ij.; Caryophyllorum, Pulv. Capsici, aa 3 jss.; Potassæ Sub-carbon. 3 ij.; Olei Anisi 3 jss.; Spirit. Vini Tenuior. (vel Sp. Vini Gallicæ, vel Sp. Vini Hollandiæ), O ij. Macera leni cum calore per dies viij. ad xij.; dein exprime et cola.

## Form. 709. TINCTURA CARYOPHYLLORUM.

- R Caryophyllorum contus. 3 iij.; Spirit. Vini Tenuior. O ij. Macera benè, et cola.

## Form. 710. TINCTURA CASCARILLÆ ALKALINA.

- R Corticis Cascarillæ cont. 3 iv.; Potassæ Sub-carbon. 3 ss.; Spirit. Tenuior. 1b ij. Macera benè, et cola. Dosis 3 j. —3 iij.

## Form. 711. TINCTURA CASTOREI ALKALINA.

- R Castorei contus. 3 iij.; Potassæ Sub-carbon. 3 iij.; Croci Stigm. 3 ij.; Spirit. Rosmarini 1b ij. Macera per triduum, et cola. M. Dosis 3 ss. —3 ij.

## Form. 712. TINCTURA CENTAURII CACUMINUM.

- R Centaurii Cacumin. (flowering tops of Centaury), 3 iij.; Spiritus Tenuioris O ij. Digere per dies quatuordecim, et cola.

## Form. 713. TINCTURA CINCHONINÆ SULPHATIS.

- R Cinchoninæ Sulphatis gr. xxxvj.; Alcoholis Rect. 3 iij.; Solve. Dosis 3 j. —3 iij.

## Form. 714. TINCTURA CONII.

- R Conii Foliorum exsiccatorum 3 ij.; Cardamomi Semin. contusorum 3 iij.; Spiritus Tenuioris O j. Digere per dies septem, et per chartam cola.

## Form. 715. TINCTURA DIGITALIS ÆTHEREÆ.

- R Fol. Digitalis exsic. et pulv. part. j.; Æther. Sulphur. part. iv. Macera per triduum, et cola. (Dosis, ʒj. —xxx. ter die. (Several continental Pharmacopœias.)

## Form. 716. TINCTURA DIOSMÆ CRENATÆ.

- R Fol. Diosmæ Crenatæ 3 ij.; Spirit. Tenuioris O j. Macera per dies septem, et cola. (Dose 3 j. —3 iij.)

## Form. 717. TINCTURA DIURETICA.

- R Olei Juniperi 3 ss.; Ætheris Nitrici, Tincturæ Digitalis Ætherææ, aa 3 iij. M. (Dosis 3 ss. —3 j. ter quaterve in die. HUFELAND.)

## Form. 718. TINCTURA FERRI ÆTHEREÆ.

- R Acidi Muriatici 3 ij.; Acidi Nitrici dilut. 3 jss.; Ferri Rimaturæ. q. s. Dissolve the iron in the acids, evaporate to dryness; afterwards deliquesce the residue by exposure to the air, and mix the deliquesced liquor with double its weight of Sulphuric Æther; agitating the mixture frequently until it assumes a golden yellow colour; then decant, and add double the quantity of rectified Alcohol. This Tincture may be used previously to the addition of the Alcohol, or subsequently. In the state of Æther the dose is from 16 to 20 drops; in that of Æthereal Tincture, from 20 to 30 drops; in diseases of Debility, and Spasmodic Affections.

## Form. 719. TINCTURA FRUCTUS VANILLÆ.

- R Fructus Vanillæ concis. et contus. pars j.; Alcoholis part. vj. Macera leni cum calore per dies octo, et cola (Nervine, Analeptic, Excitant, &c. PFAFF.)

## Form. 720. TINCTURA GALBANI COMPOSITA.

- R Galbani Gummi Resinæ 3 jss.; Pimentæ Baccarum contus. 3 j.; Cardamomi Semin. contus. 3 ss.; Spirit. Rectif. O j.; Aquæ Destil. O ss. Macera dies quatuordecim, et cola.

## Form. 721. TINCTURA GALLÆ.

- R Gallarum contus. 3 ij.; Spirit. Tenuioris O ij. Macera per dies octo, et per chartam cola.

## Form. 722. TINCTURA IODINÆ FORTIOR.

- R Iodinæ 3 ij.; Spirit. Rectificat. 3 j. Solve, terendo in vase vitro. 3 j. contains five grains of Iodine. Dose ʒj. —xxiv.

## Form. 723. TINCTURA IODINÆ MITIOR.

- R Iodinæ gr. xxiv.; Spirit. Rectif. f. 3 j. Solve, terendo in vase vitro. M. 3 j. gr. iij.

## Form. 724. TINCTURA LOBELIÆ INFLATÆ.

- R Herb. Lobeliæ Inflatæ exsic. 3 ij.; Spirit. Vini Ten. O j. Digere per dies decem, et cola. (Emetic in doses of 3 j. to 3 ij.; Antispasmodic in doses of ʒj. xx. to 3 ss.; and Diuretic in smaller quantities.)

## Form. 725. TINCTURA MYRRHÆ ALKALINA.

- R Myrrhæ 3 j.; Potassæ Sub-carb. 3 vj.; Aquæ Fermentis 3 iij. Tere; dein macera in balneo aren. ad mellis crassitud., et adde Spirit. Tenuior. 3 x. Macera benè, et cola. Capiat 3 j. —3 ij. ex Infus. Anthemidis. (In Scrofula, &c.)

## Form. 726. TINCTURA NERVOSA. (RIEMERII.)

- R Spirit. Cornu Cervi Rect. part. iv.: adde gradatim Alcohol. Rect. part. xvj.; Camphoræ part. ij.; Olei Junip. pars j. Solve.

## Form. 727. TINCTURA NUCIS VOMICÆ.

- R Extracti Nucis Vomicæ exsic. gr. iv.; Alcoholis (36°) f. 3 j. Solve. (3 j. Tincturæ ad gr. ss. Extracti.)

## Form. 728. TINCTURA OPII CAMPHORATA. (Sive Elixir Paregoricum Pharm. Pristin.)

- R Camphoræ 3 ij.; Opii Crud. in pulv., Acidi Benzoici, aa 3 j.; Olei Anisi 3 ss.; Potass. Sub-carbon. 3 j. Omnia in mortario simul optimè terentur; paulatim affunde Spiritus Tenuioris O ij.: stent in digestionem per dies decem: tum adde Radicis Glycyrrhizæ incisæ 3 iv.; digere iterum per dies septem, et cola.

## Form. 729. TINCTURA OPII COMPOSITA. (Vel Laudanum Liquidum Verum Sydenhamii.)

- R Opii Puri contrit. 3 ij.; Croci 3 j.; Cort. Canellæ, Caryophyllorum, aa 3 jss.; Spirit. Vini Rect. 3 iv.; Vini Hispan. 1b j. Macera cum leni calore per dies xvj.; dein exprime et cola. (ʒj. xv. equal to 1 grain of pure Opium.)

## Form. 730. TINCTURA PHELLANDRII. (MARCUS.)

- R Semin. Phellandrii Aq. 3 ss.; Alcoholis 3 vj. Macera per horas xxiv., et adde Vini Burgundiæ 3 vj. Macera per dies tres, et cola. Capiat ʒj. —lx. (In chronic Bronchial, and Pulmonary Affections.)

## Form. 731. TINCTURA QUININÆ SULPHATIS.

- R Quininæ Sulphatis gr. viij.; Spiritus Vini 3 j. M. Fiat Tinctura.

## Form. 732. TINCTURA QUININÆ SULPHATIS ACID.

- R Quininæ Sulphatis gr. xlvij.; Tinctura Aurantii Comp. 3 vss.; Acidi Sulphurici Dilut. 3 ij. M. Fiat Tinctura. (Dosis 3 ss. ad 3 ij.)

## Form. 733. TINCTURA RHATANIÆ. (SPRAGUE.)

- R Rhatanæ Radicis contus. 3 iij.; Spiritus Tenuioris O ij. Digere per dies octo, et per chartam cola. This Tincture is strongly impregnated with the medicinal virtues of the root. It is a very grateful tonic, when given according to the following formula:—

- R Infus. Rosæ 3 x.; Acid. Sulph. Aromat. ʒj. xv.; Tinct. Rhatanæ, Syrup. Rheados, aa 3 j. M. Fiat haustus, ter in die hauriendus.



Form. 734. TINCTURA RHATANIÆ AROMATICA.  
(SPRAGUE.)

- R Rhatanix Radicis contusæ 3 iij.; Canellæ Corticis contusæ 3 ij.; Spiritus Tenuioris O ij. Digere per dies decem, et per chartam cola. The following is an agreeable method of exhibiting this tincture:—
- R Infus. Aurantii Compositi 3 vj.; Tincturæ Rhatanix Aromat., Syrup. Zingiberis, aa 3 j. Misce. Fiat mistura; cujus sumat coch. ampl. iij. ter in die, urgente languore vel flatu.

## Form. 735. TINCTURA RHEI ANISATA.

- R Radicis Rhei concis., Radicis Glycyrrhizæ concis., aa 3 ij.; Seminum Anisi contus., Sacchari Purif. aa 3 j.; Spiritus Tenuioris octarios ij. Macera per dies quatuordecim, et cola.

## Form. 736. TINCTURA RHODII.

- R Rhodii Ligni ras. 3 iv.; Spiritus Rectificati O j. Macera per dies quatuordecim, et per chartam cola.

## Form. 737. TINCTURA SABINÆ ALKALINA.

- R Olei Essent. Sabinæ 3 ij.; Tinct. Alkalinæ 3 vij. et 3 ij. (F. 696). Solve. Dosis M xx.—xxx.

## Form. 738. TINCTURA SENNÆ AMARA.

- R Fol. Sennæ part. vj.; Radicis Gentianæ concis. part. iv.; Corticis Aurantii exsic. part. ij.; Cardamom. Semin. contus. part. j.; Spirit. Vini Ten. partes xlv. Macera per dies quatuordecim, et cola.

## Form. 739. TINCTURA STRAMONII.

- R Daturæ Stramonii Seminum contus. 3 ij.; Spiritus Tenuioris O j. Macera per dies quatuordecim, et cola.

## Form. 740. TINCTURA STRYCHNINÆ.

- R Strychninæ Puræ gr. ij.; Alcoholis (sp. gr. 838.) f 3 j. Solve. Dosis M viij. ad xxx.

## Form. 741. TINCTURA TABACCI.

- R Fol. Nicot. Tabacchi 3 ij.; Alcohol. Rect. O j. Macera per dies septem; exprime et cola.

## Form. 742. TINCTURA TABACCI COMPOSITA.

- R Tabacchi Foliorum concis. 3 ss.; Camphoræ rasæ 3 ij.; Spirit. Rectif., Aquæ Destil., aa 3 iv. Macera per dies octo, et cola.

## Form. 743. TROCHISCUS CATECHU EXTRACTI.

- R Catechu Extract. Pulv. 3 iij.; Cinnamomi Corticis in pulv. 3 jss.; Olei Cinnamomi M v.; Sacchari Purificati 3 xiv.; Mucil. Tragacanth q. s. Fiat massa in Trochiscos formanda. (SPRAGUE.)

## Form. 744. TROCHISCUS IPECACUANHÆ.

- R Ipecacuanhæ Radicis Pulv. 3 iv.; Sacchari Purificati lb ij.; Mucil. Tragacanth, q. s. Misce secundum artem ut fiat Troch. 480. (Each lozenge contains half a grain of Ipecacuanha. In recent Coughs and in Diarrhœa.)

## Form. 745. TROCHISCUS LACTUCÆ.

- R Extract. Lactucæ Concentrat. (Probart's), Extracti Glycyrrhizæ, Pulv. Acaciæ Ver., aa 3 iv. Hæc optimè terantur simul, et cum aquâ fiat massa, in Trochiscos formanda.

## Form. 746. TROCHISCI NITRO-CAMPHORATI.

- R Extr. Opii gr. vij.; Camphoræ rasæ gr. xxvj.; Potassæ Nitratis 3 ijss.; Sacchar. Purif. 3 iij.; Mucilag. q. s. Misce benè, et divide in Tabulas l.; quarum capiat vj.—x. per diem. (CHAUSSIER.)

## Form. 747. TROCHISCUS POTASSÆ NITRATIS.

- R Potassæ Nitratis Pulv. 3 iv.; Sacchari Purificati lb j.; Hæc optimè terantur simul, et cum Mucil. Tragacanth. fiat massa in Trochiscos formanda.

## Form. 748. TROCHISCUS ZINCI SULPHATIS.

- R Zinci Sulphatis Purif. 3 iv.; Sacchari Purificati lb ij. Hæc optimè terantur simul, et cum Mucil. Tragacanth. fiat massa in Trochiscos formanda. (This mass should be equally divided, so that each lozenge may contain gr.  $\frac{1}{4}$  of the Zinc.)

## Form. 749. UNGUENTUM ANTIMONII TARTARIZATI, VEL FEBRIFUGUM. (1.)

- R Antimonii Tartarizati gr. xxv. Solve in Aquæ Destil. q. s.; dein adde Antimonii Tartarizati in pulv. subfiss. redacti 3 jss.; Adipis Præparat. 3 x. Misce benè, et fiat Unguentum. (Produces Phlogosis, and its antimony is partially absorbed.)

## Form. 750. UNGUENTUM ANTIMONII TARTARIZATI. (2.)

- R Antimonii Tartarizati in pulv. 3 j.; Adipis Præparat. 3 j.; Camphoræ rasæ et subact. 3 j.; Olei Cajuputi M xv.; Moschi gr. iij. Misce benè.

## Form. 751. UNGUENTUM ANTIMONII TARTARIZATI. (3.)

- R Antimonii Tartarizati 3 jss.; Adipis Præparati 3 j.; Balsami Peruviani M xv. M.

## Form. 752. UNGUENTUM ARGENTI NITRATIS.

- R Argenti Nitratis Pulv. gr. xl.; Adipis Præpar. 3 j. Liq. Plumbi Acet. 3 ij. M. Fiat Unguentum.

## Form. 753. UNGUENTUM BALSAMI PERUVIANI.

- R Balsami Peruviani, 3 j.; Unguenti Elemi Comp. 3 vij. Unguento balneo in aquoso liquefacto; adijce Balsamum Peruvianum, et fiat Unguentum.

## Form. 754. UNGUENTUM BELLADONNÆ. (1.)

- R Belladonnæ Fol. recent.; Adipis Præparatæ, aa 3 iv. The leaves are to be bruised in a marble mortar; after which the lard is to be added, and the two incorporated by beating. They are then to be gently melted over the fire; and after being strained through a cloth, and the Belladonna well pressed, the ointment is to be stirred till quite cold. (SPRAGUE.)

## Form. 755. UNGUENTUM BELLADONNÆ. (CHAUSSIER.) (2.)

- R Ext. Belladonnæ 3 ij.; Aquæ Destil. 3 jss. Tere cum Unguent. Simp., vel cum Axungia, 3 ijss. M.

## Form. 756. UNGUENTUM CALOMELANOS ET CAMPHORÆ.

- R Calomelanos, Camphoræ, aa 3 j.; Olei Caryoph. M iv.; Unguent. Simp. 3 ij. M.

## Form. 757. UNGUENTUM CALOMELANOS CUM CAMPHORÆ.

- R Calomelanos 3 ij.; Camphoræ 3 j.; Unguent. Simp. (vel Ung. Sambuci Flor.) 3 vj. M. Fiat Unguentum.

## Form. 758. UNGUENTUM CAMPHORÆ COMPOSITUM.

- R Saponis Albi rasi 3 jss.; Camphoræ rasæ 3 iij.; Olei Terebinthinæ 3 ss. Misce paulatim, et adde Ammonia 3 j. M.

## Form. 759. UNGUENTUM COMITISSÆ.

- R Olei Pimentæ, Olei Olivæ, aa 3 ijss.; Cera Flavæ 3 j. Solve, et adde Pulv. Pimentæ 3 iij.; Pulv. Gallarum, Pulv. Nucis Cupressi, Pulv. Sem. Plantaginis, Pulv. Fol. Toxicodend., aa 3 jss.; Sulphatis Aluminis 3 j.; Camphoræ rasæ 3 j. Misce benè, et sit Unguentum.

## Form. 760. UNGUENTUM CUPRI ACETATIS; vulgo, UNGUENTUM ÆRUGINIS.

- R Cupri Acetatis, Hydrargyri Protochlorid. (Calomel.), aa 3 j.; Cerati Resinæ 3 j.; Terebinthinæ Vulgaris 3 ss. Liquefac Resinæ Ceratum in balneo aquoso, et Terebinthinam adijce; tunc Cupri Acetatem et Hydrargyri Protochloridem (prius commistas) insperge, et omnia misce.

## Form. 761. UNGUENTUM DEOBSTRUENS. (1.)

- R Ammonia Muriatis pulverizat. 3 j.; Unguenti Hydrarg. Fort. 3 j.; Extr. Cicutæ 3 jss. Misce benè, et fiat Unguentum. (DR. HUNEFELD. Tumours, Indurations, &c.)

## Form. 762. UNGUENTUM DEOBSTRUENS. (2.)

- R Unguenti Hydrarg. Fort. part. xciv.; Ammonia Muriatis pulveriz. part. vj. Misce benè. (M. DUPUYTREN.)

## Form. 763. UNGUENTUM GALLÆ OPIATUM.

- R Gallarum in pulv. subtil. 3 iij.; Opii Crudi Pulver. 3 j. Unguenti Plumbi Acetatis 3 iij. M. Fiat Unguentum.

## Form. 764. UNGUENTUM GALLÆ OPIO-CAMPHORATUM.

- R Pulv. Nucis Gallarum 3 j.; Camphoræ rasæ et subactæ in pauxillo Alcoholis 3 j.; Pulv. Opii Puri, Potassæ Nitratis Pulveriz., aa 3 ss.; Adipis Præparatæ 3 iij.; Olei Pimentæ M xii.—xvj. Misce benè, et sit unguentum ter quaterve in die applicandum.



Form. 765. UNGUENTUM HYPO-CHLORIDIS SULPHURIS.  
 R Sulphuris Hypo-chloridis 3 j.; Unguenti Simplicis 3 j. Misce benè. (Lepra, Psoriasis, and other chronic eruptions.)

Form. 766. UNGUENTUM HYDRIODATIS POTASSÆ.  
 R Potassæ Hydriodatis 3 ss.; Adipis Præparatæ 3 jss.

Form. 767. UNGUENTUM IODINÆ.  
 R Iodinæ gr. xij.; Potassæ Hydriodatis 9 iv.; Adipis Suillæ recent. præpar. 3 ij. M.

Form. 768. UNGUENTUM IODINÆ OPIATUM.  
 R Iodinæ gr. xv.; Potassæ Hydriodatis 3 j.; Adipis recent. præp. 3 ij. Misce benè, et adde Extr. Opii gr. xxx.; Tinct. Opii 3 j. Sit Unguentum.

Form. 769. UNGUENTUM IODURETI PLUMBI.  
 R Iodureti Plumbi 3 ij.—3 iij.; Adipis Suil. recentis præpar. 3 ij. Misce.

Form. 770. UNGUENTUM NERVINUM.  
 R Unguenti Althææ (vel Ung. Sambuci) 3 iv.; Liq. Ammoniac 3 j.; Camphoræ, Petrolei, Spirit. Terebinth., aa 3 ss.; Olei Rosmarini 3 ij.; Olei Bergamottæ 3 j. M. (HUFELAND.)

Form. 771. UNGUENTUM POPULEUM.  
 R Gemmæ, vel Occulor. Populi Balsamiferæ, vel Nigræ contus. 1b ss.; Butrei recentis 1b j. Liquefac simul lento igne, vel in balneo arenario, et exprime.

Form. 772. UNGUENTUM POPULEUM COMPOSITUM.  
 R Gemmæ Populi Bals. vel Nig. recentis 1b jss. Contunde eum Adipis Præparat. 1b iij., et adde Fol. recentis Hyoscyami Nigri, Fol. recentis Belladonnæ, aa 3 iv. Contunde simul, et macera leni cum calore donec dispareat humiditas; dein exprime. (All the German Pharmacopœias.)

Form. 773. UNGUENTUM AD PORRIGINEM. (CHAPMAN'S.)  
 R Sulphuris Sublimati, Unguenti Picis Liquidæ, aa 3 jss.; Saponis Mollis, Ammoniac Muriatis, aa 3 ss. Misce. Fiat Unguentum.

Form. 774. UNGUENTUM AD PORRIGINEM GALEATAM. (BANYER'S.)

R Hydrargyri Protochlorid. (Calomel.) 3 ij.; Aluminis Exsiccat., Plumbi Sub-carbonatis, aa 3 ss.; Terebinthinæ Venet. 3 vj.; Cerati Cetacei 3 jss. Misce. Fiat Unguentum.

Form. 775. UNGUENTUM PROTO-IODURETI HYDRARGYRI.

|                           |         |        |        |
|---------------------------|---------|--------|--------|
|                           | No. 1.  | No. 2. | No. 3. |
| R Proto-Iodureti Hydrarg. | - 9 ij. | 9 iij. | 9 iv.  |
| Adipis Suillæ recent.     | - 3 ij. | 3 ij.  | 3 ij.  |
| Misce.                    |         |        |        |

Form. 776. UNGUENTUM SULPHURETI IODINÆ.  
 R Sulphuris Iodinæ gr. xv.—xxv.; Axungia 3 j. M.

Form. 777. UNGUENTUM ZINCI IODATIS.  
 R Zinci Iodatis 3 j.; Adipis Præparatæ 3 j. M.

Form. 778. VINUM ALOES ALKALINUM.  
 R Aloës Socot., Croci Stigm., Myrrhæ, aa 3 j.; Potassæ Sub-carbon. 3 ij.; Vini Alb. Hispan. 1b ij. Macera per dies xij. et cola. In dos. 3 ij.—3 j. (In Pyrosis, Dyspepsia, &c.)

Form. 779. VINUM ALOES ET SODÆ COMPOSITUM.  
 R Sodæ Sub-carbonatis 3 iij.; Ammoniac Carbonatis 3 ivss.; Myrrhæ 3 vj.; Aloës Extracti 3 vj.; Vini Albi (Sherry, Anglicè), f. 3 xxiv. Macera per dies septem, et cola. (The dose is from one fluid drachm to half a fluid ounce.)

Form. 780. VINUM ANTHELMINTICUM.  
 R Extr. Aloës, Assafoetida, Radicis Gentianæ, Camphoræ, Corticis Aurantiæ sic., Castorei, aa 3 j.; Croci Stig. 9 j.; Spirit. Vini Ten. 1b iij.; Vini Oporto 1b iij.; Macera leni calori, et post horas xij. cola. Capiat 3 j.—3 iij. In Decocti Anthemid., &c.

Form. 781. VINUM DIURETICUM ANTI-ARTHRITICUM.  
 R Potassæ Sub-carbon. 3 ijs.; Pulv. Rhei, Juniperi Baccar. cont., aa 3 jss.; Rad. Zedoarii concis. et contus. 3 ij.; Canellæ in pulv. 3 iij.; Scillæ Rad. exsic. 3 j.; Vini Xeres 3 xxxij. Macera benè, et cola. 3 j.—3 ij. bis terve quotidie.

Form. 782. VINUM FERRI CITRATUM. (Phar. Wirtem. et Niemann.)

R Ferri Limaturæ 3 iv.; Aurantia Amara, No. iv. Excorticatis Aurantiis, cortices et succulenta caro fructuum cum Limatura Ferri in pastam redigantur mortario in lapideo. Dies post tres infunde Vini Madeirensis 3 xij.; Tincturæ Aurantii 3 ij. Macera per diem integrum, et cola. Dosis 3 ss.—3 jss.

Form. 783. VINI FERRI COMP.  
 R Sub-carbonatis Ferri 3 j., vel Ferri Fragmentor. 3 iij.; Radicis Calami Arom. 3 ij. Infunde Vini Albi Hispanici 1b ij., et stent in digestionem per dies 6—8. Exindè sumantur quotidie uncia una vel duæ, et suppleatur vinum.

Form. 784. VINUM QUININÆ.  
 R Vini Madeirensis 3 viij.; Quininæ Sulphatis gr. xvj. M.

## ADDENDA TO APPENDIX OF FORMULÆ.

Form. 785. BALSAMUM ODONTALGICUM.  
 R Opii Puri, Camphoræ rasæ, aa 9 j.: solve in Spirit. Rect. Terebinth. 3 jss.; Olei Caryoph. et Ol. Cajeputi aa 3 ss.; Balsam. Peruvian. 3 ij. Misce benè.

Form. 786. BOLUS CAMPHORÆ COMPOSITUS.  
 R Camphoræ gr. v.—xv.; Hydrarg. Submur. gr. v.—xx.; Opii Puri gr. j.—iij.; Conserv. Rosarum q. s. ut fiat Bolus.

Form. 787. BOLUS CAMPHORÆ ET HYOSCYAMI.  
 R Camphoræ Subactæ gr. v.—xij.; Extract. Hyoscyami gr. v.—x.; Potassæ Nitratis gr. v.—viij.; Conserv. Rosar. q. s. M. Fiat Bolus, horâ somni sumendus. (In Puerperal Mania, and in Mania after evacuations, and accompanied with cold sponging the head.)

Form. 788. BOLUS CATECHU.  
 R Catechu Extr. gr. viij.—xij.; Confect. Aromat. gr. viij. Syrup. q. s. M. Fiat Bolus.

Form. 789. BOLUS MOSCHI ET CAMPHORÆ.  
 R Moschi gr. v.—x.; Camphoræ rasæ gr. iij.—viij.; Spirit. Rect. 1b j.; Confect. Ros. Gall. q. s. Camphoram cum Spiritu tere, et deinde, secundum artem, fiat Bolus.

Form. 790. ELECTUARIUM DEOBSTRUENS.  
 R Potassæ Supertart. 3 j.; Sub-boracis Sodæ 3 iij.; Sulphur. Præcipit. 3 vj.; Confectionis Sennæ 3 jss.; Syrup. Zingiberis 3 vj.; Syrup. Papaveris 3 iij. M. Fiat Electuarium, cujus capiat cochlearia duo minima omni nocte.



## Form. 791. ELECTUARIUM FERRI SUB-CARB.

- R Ferri Subcarbonatis, Syrupi Zingiberis, aa 3ss.; Confectionis Aurantiorum 3ij. M. Fiat Electuarium, de quo capiatur moles nucis moschatae bis vel ter quotidie.

## Form. 792. EMPLASTRUM ANTIMONII TARTARIZ.

- R Emplast. Picis Comp. quantum velis; Super Alutam extende, et Antimon. Tartar. pulvere leviter insperge. Fiat Emplastrum.

## Form. 793. EMPLASTRUM PICIS ET PETROLEI.

- R Picis Liquidæ 3ij.; Galbani 3j.; Sulphuris, Succini, aa 3ij.; Semin. Cumini cont., Pulv. Flor. Anthemidis, aa 3jss.; Petrolei 3ss. Liquefac Galbanum cum Aceti q. s., eumque misce cum Pice liquida; dein adde alia, et misce bene.

## Form. 794. ENEMA COMMUNE.

- R Sodæ Muriatis 3vj.—3j.; Decocti Avenæ 3x.; Olei Lini 3jss.—3ijss. M. Fiat Enema.

## Form. 795. ENEMA IPECACUANHÆ.

- R Rad. Ipecacuanhæ Contritæ 3j.; Aquæ Ferventis 3x. Macera per horam et fiat Enema.

## Form. 796. FOTUS CONII.

- R Conii Folior. exsic. 3j. Coque ex aquæ Oijss. ad Oij., et cola.

## Form. 797. GARGARISMA CAPSICI.

- R Capsici Baccarum contus. gr. xv.; Aquæ ferventis 3ix. Infunde per horas tres, et cola.

- R Liqueoris Colati 3vjss.; Acidi Muriatici 3xxv. ad 3xxxv.; Tinct. Myrrhæ 3ijss.; Mellis Rosæ 3ss. M. Fiat Gargarisma. (The Borax Sodæ, Extractum Catechu, or any other astringent, may be substituted, according to circumstances, in the place of the Muriatic Acid.)

## Form. 798. GARGARISMA CUM CHLORURETO SODÆ.

- R Liqueoris Chloro-Sodaici (Labarraquii) 3xij.; Aquæ Destillat. 3vj.; Mellis 3ss. M. Fiat Gargarisma sæpe utendum.

## Form. 799. GARGARISMA STIMULANS.

- R Infusi Petal. Rosæ Gallicæ 3vjss.; Acidi Muriatici Diluti 3ij.; Tinct. Capsici 3jss.; Mellis 3ijj. Fiat Gargarisma sæpe utendum.

## Form. 800. GARGARISMA ZINCI SULPHATIS.

- R Zinci Sulphatis 3j.; Aquæ Rosæ f 3vij.; Oxymellis Simpl. f 3j. M. Fiat Gargarisma frequenter utendum.

## Form. 801. GUTTÆ ÆTHEREÆ.

- R Camphoræ rasæ 3j.; Spiritus Æther. Nit. f 3ss.; Tinct. Valerianæ f 3ij.; Aquæ Fontanæ 3jss. M. Capiat 3ss. ad 3ij. pro dosi.

## Form. 802. GUTTÆ ÆTHERIS ABSINTHII.

- R Olei Æther. Absinthii 3ss.; Spirit. Æther. Sulphurici, et Spirit. Vin. Rect., aa 3ij. M. Sumat æger gut. xx.—xxx. omni horâ, aut omni bi aut trihorio.

## Form. 803. GUTTÆ ANTISPASMODICÆ.

- R Spirit. Ammon. Succin. 3vj.; Æther. Sulphur. 3j.; Olei Anthemidis 3j.; Tinct. Opii Comp. 3ij.; Extr. Papaveris Albi 3j. M. Capiat 3j. xx.—xl. in cyatho Infus. Anthemidis, vel Infus. Flor. Sambuci, vel Decoct. Hordei Comp., &c. (GRIMAUD.)

## Form. 804. GUTTÆ ODONTALGICÆ.

- R Opii Puri et Camphoræ aa gr. x. Solve in pauxillo Alcoholis, et adde Olei Caryophil. 3j.; Olei Cajeputi 3j. Misce bene.

## Form. 805. HAUSTUS ACIDI OXYMURIATIS.

- R Acidi Oxymuriatis Fluid. 3ss.; Aquæ Destillat. 3xij.; Syrup. Papaveris Albi 3ss. M. Fiat Haustus 5tis vel 6tis horis sumendus.

## Form. 806. HAUSTUS ARSENICALIS.

- R Confectionis Aromaticæ 3j.; Aquæ Menthæ Sativæ f 3j.; Tincturæ Opii, Liqueoris Arsenicalis, aa 3vj. M. Fiat Haustus, ter quotidie sumendus.

## Form. 807. HAUSTUS BALSAMI PERUVIANI.

- R Balsami Peruviani 3j. v. ad 3j.; Mucilaginis Acaciæ 3jss. Tere simul; et adde, Mist. Camphoræ 3vj.; Spiritus Anisi 3jss.; Aquæ Anethi (vel Aq. Cinnam.) 3ss. Fiat Haustus, ter quaterve de die capiendus.

## Form. 808. HAUSTUS BELLADONNÆ ET CINCHONÆ.

- R Decocti Cinchonæ 3xiv.; Extracti Cinchonæ gr. x.; Tincturæ Belladonnæ 3j. xx. (See F. 704.); Tincturæ Aurantiorum 3jss. M. Ft. Haustus, ter in die capiendus.

## Form. 809. HAUSTUS DIAPHORETICUS.

- R Vini Ipecacuanhæ, Vini Antimonii Tartarizati, aa 3j. x.; Liq. Ammon. Acet. 3ijss.; Mist. Camphoræ 3j.; Tinct. Hyoscyami 3xxv.; Spirit. Æther. Nit. 3ss.; Syrup. Aurantii 3j. M. Fiat Haustus, quartis horis capiendus.

## Form. 810. HAUSTUS EMMENAGOGUS.

- R Decocti Aloës Comp. 3j.; Sub-boratis Sodæ 3j.; Tinct. Aloës Comp. 3j.; Tinct. Castorei 3j.; Tinct. Croci 3ss.; Aquæ Cinnam. 3ij. Fiat Haustus omni nocte sumendus.

## Form. 811. HAUSTUS HYOSCYAMI ET ANISI.

- R Extracti Hyoscyami gr. iij.—v.; Tinct. Scillæ 3j. x.—xij.; Spirit. Anisi 3jss.; Aquæ Anisi 3jss.; Acidi Nitrici 3vij. Fiat Haustus, horis tertiis vel quartis durante paroxysmo Dyspnææ, &c. capiendus.

## Form. 812. HAUSTUS NERVINUS.

- R Spirit. Ammon. Fœtid., Spirit. Colchici Ammoniaci, Spir. Æther. Nit., aa 3ss.; Liqueor. Ammoniacæ Acet. 3ij.; Mist. Camphoræ 3j.; Syrup. Croci 3j. M. Fiat Haustus, bis terve in die sumendus.

## Form. 813. HAUSTUS PECTORALIS.

- R Balsam. Peruvian. (vel Bals. Tolutan.) 3ss.—3ss.; Olei Anisi 3j. v.—x.; Extr. Conii gr. iij.—vj.; Mucilag. Gummi Acaciæ 3ij.; Aquæ Pimentæ et Aq. Fœniculi aa 3ss. M.

## Form. 814. HAUSTUS QUASSIÆ ET FERRI.

- R Tincturæ Ferri Muriatis 3j. vj.—xij.; Infusi Quassiæ, Aquæ Cinnam., aa f 3vj.; Tincturæ Calumbæ f 3j. M. Fiat Haustus, manè et meridiè sumendus.

## Form. 815. HAUSTUS SALINUS.

- R Potassæ Sub-carbonatis 3j.; Succo Limonum recentis f 3ss.; Misturæ Camphoræ f 3j.; Potassæ Nitratis gr. x.; Syrupi Rhæados f 3j. M. Fiat Haustus, quartâ quâque horâ sumendus.

## Form. 816. HAUSTUS SALINUS AROMATICUS.

- R Potassæ Subcarbonatis 3j.; Succo Limonum recentis f 3ss. vel q. s.; Aquæ f 3j.; Spirit. Myristicæ, Syrupi Aurantii, aa f 3j. M.

## Form. 817. HAUSTUS SALINUS DEMULCENS.

- R Mist. Amygdal. Dulc., Mist. Camph., aa 3ss.; Vini Ipecac. 3j. x.; Potassæ Carbonatis gr. xv.; Syrup. Scillæ 3j. M. Sumatur cum Succo Limonis coch. uno amplo, in effervescentiâ impetu ipso.

## Form. 818. HAUSTUS SALINUS SEDATIVUS.

- R Potassæ Nitratis gr. vj.—xv.; Sodæ Sub-carbon. gr. x.—3jss.; Tinct. Hyoscyami 3ss. (vel Tinct. Camphoræ Comp. pristin. 3j.); Mist. Camphoræ, Aquæ Menth. Virid., aa 3vj. Syrup. Croci 3ss. M. Fiat Haustus tertiis vel quartis horis sumendus.

## Form. 819. HAUSTUS SEDATIVUS.

- R Ammoniacæ Carbonatis gr. xv.; Aquæ Destillat. 3j.; Spirit. Myristicæ 3j.; Syrup. Aurantii 3ss.; Extr. Conii gr. iij.—vj. Fiat Haustus, ter quaterve quotidie sumendus, cum Succo Limonis recentis cochleare uno magno, in effervescentiâ impetu.

## Form. 820. HAUSTUS SEDATIVUS CUM MAGNESIA.

- R Magnes. Sub-carb. 3ss.; Aquæ Menth. Virid. 3xj.; Spirit. Anisi 3jss.; Olei Caryoph. 3j.; Syrup. Zingib. 3ss. M. Fiat Haustus.

## Form. 821. HAUSTUS SEDATIVUS ET REFRIGERANS.

- R Potassæ Nitratis gr. x.; Tinct. Opii 3vj.; Syrup. Papav. Alb. 3ij.; Mist. Camphoræ 3x. Misce. Fiat Haustus, omni 6tâ horâ sumendus.



Form. 822. HAUSTUS TONICUS ALKALINUS.

- R Potassæ Carbonatis ʒj.; Infus. Gentianæ Compos., Aquæ Pimentæ, aa f ʒvj.; Tinctur. Rhæi f ʒj. M. Fiat Haustus, meridiæ et horâ somni sumendus.

Form. 823. INFUSUM ANGELICÆ SYLVESTRIS.

- R Radicis Angelic. Sylvest., Calam. Aromatici, aa ʒiij.; infunde cum Aquæ Font. Ferventis ʒvj. Stent per horam in vase clauso; cola, et adde Liquoris Ammoniacæ Acetat. ʒjss.; Etheris Sulphur. ʒjss.; Syrup. Cort. Aurantii ʒiij. M. Fiat Mist. Capiat æger quâlibet horâ cochlear. unum.

Form. 824. INFUSUM ANISI COMPOSITUM.

- R Seminum Anisi ʒjss.; Foliorum Melissæ Officialis ʒj.; Aquæ Communis calidæ lbij. Infunde per quadrantem horæ: cola; et adde Sacchari Albi, quantum libet.

Form. 825. INFUSUM GALLÆ.

- R Gallarum contus. ʒij.; Aquæ Ferventis lbj. Macera per horas viginti quatuor, et cola.

Form. 826. INFUS. SERPENTARIÆ.

- R Radicis Serpentariæ ʒiij.; infunde cum Aquæ Ferventis ʒviij., ebull. paul. Cola, et adde Ether. Sulphur. ʒij.; Tinct. Camphoræ ʒj. M. Capiat æger quâlibet horâ cochleare unum.

Form. 827. INFUSUM TURIONUM PINI ABIETIS.

- R Turion. Pini Abietis ʒiij.; infunde Aq. Fervidæ ʒx. per semi-hor.; dein exprime, cola, et adde vel Potassæ Sub-carb., vel Potassæ Sulphatem, vel Spir. Ether. Nit., vel Sp. Junip. Comp., ut sit occasio.

Form. 828. INJECTIO ASTRINGENS.

- R Quercûs Cort. cont. ʒvj.; Aquæ Destil. ʒx. Coque per partem horæ sextam, et cola.  
R Colaturæ ʒiv.; Infus. Lini ʒiv.; Extr. Conii ʒjss.; Sub-boracis Sodæ ʒj. M.

Form. 829. LINCTUS CUM IPECACUANHA.

- R Olei Amygdalarum, Syrupi Limonum, sing. f ʒj.; Pulveris Ipecacuanhæ gr. vj.; Confectionis Rosæ Caninæ ʒj.; Pulv. Tragacanthæ Comp. ʒiij. Misce. Cochleare minimum subindè deglutiat.

Form. 830. LINCTUS REFRIGERANS.

- R Pulpæ Tamarindorum, Syrup. Althææ, aa ʒij.; Potassæ Supertart. ʒijss.; Potassæ Nitratis ʒjss. M. Sumat omni trihorio duo cochlearia parva.

Form. 831. LINCTUS TEREBINTHINÆ.

- R Olei Terebinth. ʒij—ʒj.; Mellis Despumatæ ʒj.—ʒijss.; Pulv. Radicis Glycyrrh. q. s. ut fiat Linctus: de quo sumatur cochleare parvum vel medium, nocte, manè, meridièque.

Form. 832. LINIMENTUM OPIATUM.

- R Tinct. Opii Comp. ʒss.; Camphoræ ʒij.; Olei Amygdal. Dulc. ʒij. M. Sit Linimentum.

Form. 833. LOTIO ACIDI HYDROCYANICI.

- R Acidi Hydrocyanici ʒij.—Plumbi Acetatis, gr. xvi.; Aquæ Destill. ʒvijs.; Spirit. Vin. Rect. ʒij. Fiat Lotio, parte affectæ applicatura. (THOMPSON, in Cutaneous Eruptions.)

Form. 834. LOTIO ACIDI NITRO-MURIATICI.

- R Acidi Nitro-Muriatici Diluti (F. 5.) ʒij.—ʒss.; Aquæ Calidæ ʒxvj. M. Fiat Lotio, quamprimum præparata sit, ope spongæ, utenda.

Form. 835. MISTURA ALKALINA ANODYNA.

- R Sodæ Carbonatis ʒj. (vel Potassæ Carb. gr. xvj.); Misturæ Amygdalarum f ʒjss.; Tinct. Hyoscyami lbj. xx.—ʒss.; Tinctur. Cardam. compos. f ʒss. Fiat Haustus, bis vel ter die sumendus.

Form. 836. MISTURA AMMONIACI ET CONII.

- R Acidi Nitrici ʒj.; Aquæ Pulegii ʒiv. Misce; deintere cum Ammoniaco ʒj., et adde Extr. Conii ʒss.; Syrup. Tolutan. ʒss. M. Capiat coch. unum in decoct. Althææ, &c.

Form. 837. MISTURA ANODYNA.

- R Aquæ Menth. Virid. ʒvjss.; Potassæ Nitratis ʒij.; Spirit. Etheris Nit. ʒij.; Tinct. Hyoscyami ʒjss.; Succus Inspissati Samb. Nig. ʒjss.; Extracti Taraxaci, Syrup. Aurantii, aa ʒij. M. Fiat Mist. cujus capiat cochlearia duo larga ter quotidie.

Form. 838. MISTURA ANTI-CARDIAGIAM.

- R Magnesiae ʒj.; Aquæ Anethi ʒivss.; Potassæ Nitratis ʒjss.; Liqueor. Potassæ ʒj.; Tinct. Calumbæ ʒij.; Spirit. Carui et Spirit. Anisi aa ʒijss.; Spirit. Lavand. Comp. ʒj.; Syrup. Zingiberis ʒij. Misce. Capiat cochleare unum amplum subinde in cyatho Decoct. Hordei Comp., prius agitata phiala.

Form. 839. MISTURA ANTIDYSENTERICA. (1.)

- R Ether. Sulphurici ʒij.; Tinct. Opii Comp. ʒiij.; Sacchar. Alb. ʒss.; Gum. Acaciæ ʒijss.; Olei Anthemidis lbj. xv.; Extr. Humuli ʒjss.; Extr. Catechu ʒj.; Pulv. Canellæ Cort. ʒj.; Aquæ Menth. Virid. ʒvjss. Misce benè. Capiat cochlearia dua tertiis vel quartis horis.

Form. 840. MISTURA ANTIDYSENTERICA. (2.)

- R Mist. Camphoræ ʒv.; Liq. Ammon. Acet. ʒij.; Spirit. Ether. Nit. ʒijss.; Vini Ipecacuanhæ ʒijss.; Tinct. Humuli ʒijss.; Extr. Humuli ʒj.; Syrup. Papaveris ʒiij. M. Fiat Mist., cujus capiat cochlearia duo larga tertiâ quâque horâ.

Form. 841. MISTURA ANTI-ICTERICA.

- R Potassæ Acetat., Extract. Taraxaci, aa ʒss.; Extr. Conii gr. x.—xx.; Aquæ Fœniculi ʒvjss.; Syr. p. Sarsæ et Syrup. Sennæ aa ʒss. M. Capiat cochlear. ij. vel iij. ampla 4tis horis.

Form. 842. MISTURA ASSAËTIDÆ ET CONII.

- R Assaëtidæ ʒij.: solve in Liquoris Ammoniacæ Acet. ʒjss.; Aquæ Fœniculi ʒijss.; Extr. Conii ʒj.—ʒss.; Syrup. Senegæ ʒss. Misce.

Form. 843. MISTURA BALS. PERUVIANI COMP.

- R Balsami Peruviani Ver. ʒij.; Mellis Despumatæ ʒvj. Misce, et adde gradatim, Misturæ Myrrhæ (F. 422.) ʒvj.; Tincturæ Aurantii ʒj. Misce. Fiat Mistura, cujus capiat coch. j. ad iij. ter quaterve in die.

Form. 844. MISTURA BELLADONNÆ.

- R Extracti Fol. Belladonnæ gr. ij. ad iv.; Moschi optimi gr. vj. ad xij.; Sacchari Albi, satis quantum ut terendo obtineatur pulvis congener: deinde adde, paulatim miscendo, Infusi frigidæ Rad. Valerianæ ʒiv.; Spirit. Ether. Sulphur. ʒj.; Syrup. Papaveris ʒiij. M. Capiat æger cochlear. ij. vel iij. larga 3tiis, 5tis, vel 6tis horis.

Form. 845. MISTURA CAMPHORÆ AMMONIATA.

- R Camphoræ ʒj.; Alcoholis lbj. vj.: tere, et adde Moschi ʒss.: tere cum Sacchar. Albi ʒj.; Mist. Amygdal. Dulc. ʒiv.; Spirit. Ammon. Arom. ʒij.; Syrup. Aurantiar. ʒss. M. Capiat ʒss.—ʒj. 4tis horis.

Form. 846. MISTURA CARDIACA.

- R Potassæ Carbonatis ʒjss.; Misturæ Camphoræ f ʒvss.; Confectionis Aromaticæ ʒij.; Spiritus Myristicæ f ʒss. M. Fiat Mistura, cujus sumatur cochlearia tria ampla cum cochleare uno Succus Limonum recentis, in actu effervescentiæ.

Form. 847. MISTURA CHLORIDIS POTASSÆ ET SODÆ.

- R Liq. Chlor. Sodæ ʒss.; Aquæ Destil. ʒiv.; Potassæ Chlorid. ʒj.; Aquæ Pimentæ ʒijss. M. Capiat coch. j.—iij. 2dis, 3tiis, vel 4tis horis.

Form. 848. MISTURA CINCHONÆ CUM ACIDO.

- R Infus. Cinchonæ ʒvij.; Acidi Muriatici Diluti ʒj.; Tinct. Capsici ʒss.; Tinct. Croci, vel Serpentariæ, ʒiij.; Syrup. Papaveris ʒijss. M. Fiat Mist. cujus capiat coch. ij. vel iij. ampla, 4tâ q. q. horâ.

Form. 849. MISTURÆ CINCHONÆ ET ACIDI SULPH.

- R Decocti Cinchonæ ʒvss.; Acidi Sulphur. Aromat. ʒj.; Tinct. Opii lbj. xxx. M. Capiat tertiam partem ter quotidie.



## Form. 850. MISTURA COPAIBÆ.

- R. Copaibæ Ver. 3 iij.; Mucilaginis Acaciæ Ver. 3 jss. Misce. Adde gradat. Aquæ Cinnamomi 3 iijss.; Sodæ Sub-carbonatis 3 j.; Spiritus Lavandulæ Compositæ 3 ij. Tincturæ Opii 3 j. ad 3 jss. Misce. Fiat Mistura, cujus capiat unc. j. ter quaterve in die, agitat. phial.

## Form. 851. MISTURA CYDONIÆ INFUSI COMP.

- R. Seminum Cydoniæ contus. 3 ij.; Radicis Glycyrrhizæ contus. 3 j.; Fici Caricæ Fructus 3 j.; Aquæ Oj. Coque leni igne per minuta horæ decem; dein cola. Hujus Decocti 3 vjss.; Potassæ Supertart. 3 ij.; Subboratis Sodæ 3 j.; Spirit. Æther. Nit. 3 ij.; Syrup. Mori vel Syr. Limonis 3 ss. M. Fiat Mist.

## Form. 852. MISTURA DECOCTI CINCHONÆ.

- R. Decocti Cinchonæ 3 vss.; Tinct. Cinchonæ 3 iij.; Confect. Arom. 3 jss.; Spirit. Ammon. Arom. 3 jss. M.

## Form. 853. MISTURA DECOCTI GENISTÆ.

- R. Spartii Scop. Cacumin. 3 j.; Aquæ Oj. coque ad 3 viij., et adde Acetatis Potassæ 3 iijss. Spirit. Junip. Comp. 3 vj. M. Capiat Coch. ij. vel iij. larga, ter quotidie.

## Form. 854. MISTURA DIAPHORETICA.

- R. Vini Ipecacuanhæ 3 jss.; Spirit. Æther. Nit. 3 iijss.; Liq. Ammon. Acet. 3 ij.; Liq. Antimon. Tart. 3 jss.; Mist. Camphoræ 3 ivss.; Syrup. Papaveris 3 iij. M. Capiat cochlear. j. vel ij. tertiâ quâque horâ.

## Form. 855. MISTURA DIAPHORETICA ANODYNA.

- R. Mist. Superscript. (F. 854.) 3 vijss.; Tinct. Hyoscyami 3 jss. (vel Tinct. Camphoræ Comp. 3 vj., vel Extr. Conii 3 ss.) Fiat Mist.

## Form. 856. MISTURA CUM DIGITALE ET KERM. MINER.

- R. Kermes Mineral. gr. vj.; Mucilag. Acaciæ 3 iij.; Infus. Digitalis 3 iv.; Syrup. Althææ 3 j. M. Capiat cochleare unum amp. omni bihorio. (In Pneumonia, Pleurisy, &c. by BRERA.)

## Form. 857. MISTURA EXPECTORANS.

- R. Assafoetid. 3 iijss.; trituratione solve in Aquæ Menth. Virid. 3 ivss.; et adde Vini Ipecacuanhæ 3 j.; Spirit. Æther. Nit. 3 ij.; Tinct. Castorei 3 ij.; Syrup. Tolutan. 3 j. Fiat Mist. cujus capiat cochleare unum amplum 2dis vel 3tiis horis.

## Form. 858. MISTURA CUM HYDRIDATE POTASSÆ ET ACIDO PRUSSICO.

- R. Aquæ Destil. 3 ivss.; Solutio Hydriodatis Potassæ M xv.; Acidi Prussici Medicin. M x—xij.; Succ. Inspissati Lactucæ gr. xij.; Syrup. Althææ 3 j. M. Capiat 3 ij.—3 iij. omni horâ, vel 3 ss. omni bihorio.

## Form. 859. MISTURA CONTRA HYDROPEM.

- R. Fol. Digitalis 3 j.; Corticis Cinchonæ Pulv. 3 vj.; Aquæ Ferventis 3 xij. Macera per horam, et cola. Liquori colati adde Potassæ Supertart. 3 iij.; Subboratis Sodæ 3 j.; Tinct. Cinnam. Co.; Spirit. Junip. Co., aa 3 iij.; Tinct. Opii Co. M xxv. M. Capiat cochlearia duo larga ter quaterve quotidie. (Nearly as AUGUSTIN.)

## Form. 860. MISTURA INFUSI ANTHEMIDIS COMP.

- R. Flor. Anthemidis 3 ij.; Pulv. Rad. Valerian. 3 iij.; infunde Aquæ Fontan. calidæ 3 viij. Macera paulisper, et cola.  
R. Hujus Infusi 3 vij.; Tinct. Camphoræ Comp., Tinct. Castorei, aa 3 ij.; Syrup. Aurantii 3 ss. M. Capiat æger quâlibet horâ cochleare plenum.

## Form. 861. MISTURA INFUSI CALUMBÆ ET HYOSCYAMI.

- R. Infus. Calumbæ 3 vijss.; Tinct. Hyoscyami 3 ij.; Sodæ Sub-carbon. 3 jss.; Tinct. Aurant. Comp. 3 iijss.; M. 3 ss. ter quaterve in die. (In diseases of Irritability.)

## Form. 862. MISTURA INFUSI CALUMBÆ COMP.

- R. Infus. Calumbæ 3 iv.; Aquæ Menthæ Piper. vel Aquæ Anethi 3 iij.; Spirit. Anisi 3 ij.; Liquor. Ammonii vel Liquor. Potassæ 3 ij.; Syrup. Cort. Aurantii 3 ss. M.

## Form. 863. MISTURA INFUSI VALERIANÆ.

- R. Infus. Valerianæ 3 vss.; Liq. Ammonii Acet. 3 jss.; Liq. Antimonii Tart. 3 jss.; Tinct. Hyoscyami 3 jss.; Aq. Pimentæ 3 ss. M. Fiat Mist. cujus capiat æger alterâ quâque horâ cochlearia duo.

## Form. 864. MISTURA MURIATIS AMMONIÆ.

- R. Ammonii Muriat. 3 jss.; Acidi Muriatici 3 ss.; Decocti Hordei Comp. 1b j. M. Capiat cochlear. iij. ampla 2dis vel 3tiis horis.

## Form. 865. MISTURA SALINA SEDATIVA.

- R. Potussæ Nitratis, 3 ss.—3 ij.; Sodæ Sub-carbon. 3 j.—3 iijss. Mist. Camphoræ, Aquæ Menth. Virid., aa 3 iijss.; Extr. Humuli 3 ij.; Syrup. Zingiberis 3 iij. M. Fiat Mist. (Interdum adde Tinct. Hyoscyami, vel Tinct. Camphoræ Co.)

## Form. 866. MISTURA SEDATIVA.

- R. Mucilaginis Acaciæ f 3 j.; Olei Amygdalarum, Syrup. Papaveris Albi, aa f 3 ss.; Tinct. Hyoscyami f 3 jss.; Vini Ipecacuanhæ f 3 ij.; Aquæ Destillatæ f 3 vss.; Acidi Citrici q. s. ad gratam acidulat. Misce. Fiat Mist. cujus sumat coch. unum medium subindè.

## Form. 867. MISTURA CUM SODÆ SUB-BORATE.

- R. Mist. Camphoræ, Aq. Anethi, aa 3 iijss.; Subboratis Sodæ 3 ij.; Vini Ipecacuanhæ 3 jss.; Syrup. Papaveris 3 jss. M. Fiat Mist. cujus capiat cochlearia ij. vel iij. quartis horis.

## Form. 868. MISTURA CUM SODA TARTARIZATA.

- R. Sodæ Tartarizatæ Pulver. 3 vj.; Misturæ Amygdalæ f 3 vss.; Spiritus Myristicæ f 3 ss. M. Sumat tertiam partem secundâ quâque horâ.

## Form. 869. MISTURA STOMACHICA. (1.)

- R. Calumbæ Radicis contusæ 3 ss.; Calami Aromatici cont. 3 j.; Capsici Anni Bac. cont. gr. x.; Aquæ Ferventis f 3 viij. Macera per horas duas; deinde cola.

- R. Liquoris Colaturæ 3 vss.; Liquoris Potassæ Subcarbon. 3 iijss.; Tinct. Myrrhæ 3 j.; Extract. Conii gr. xv.; Syrup. Cort. Aurantii 3 ij. M.

## Form. 870. MISTURA STOMACHICA. (2.)

- R. Infus. Cascarillæ 3 vij.; Sodæ Sub-carbon. 3 iijss.; Tinct. Calumbæ 3 ss.; Æther. Sulphur. 3 ij.; Tinct. Aurantii Co. 3 iij. M. Fiat Mist., cujus capiat cochlear. ij. larga bis quotidie.

## Form. 871. MISTURA CONTRA TENESMUM.

- R. Mist. Camphoræ 3 v.; Liq. Ammon. Acet. 3 ij.; Tinct. Humuli 3 iijss.; Tinct. Camphoræ Com. 3 ss.; Extr. Humuli 3 ss.; Syrup. Papaveris 3 iij. M. Fiat Mist., cujus capiat cochlearia duo larga tertiâ quâque horâ.

## Form. 872. MISTURA TONICO-APERIENS.

- R. Decocti Cinchonæ, Infus. Sennæ, aa 3 iijss.; Potassæ Sulphatis 3 iijss.; Tinct. Sennæ 3 ss. M. Fiat Mist. cujus capiat cochlear. iij. larga bis quotidie.

## Form. 873. MISTURA TONICO-DEOBSTRUENS.

- R. Extr. Taraxaci 3 iij.; Extr. Gentianæ 3 j.; Sodæ Sub-carbon. 3 j.; Aquæ Aurantii 3 vij.; Spirit. Æther. Sulph. Co., Syrup. Rosæ, aa 3 ss. M. Capiat 3 j—3 jss., ter die.

## Form. 874. MISTURA ZINCI COMPOSITA.

- R. Zinci Sulphatis gr. iv. ad vj.; Infus. Rosarum Comp. 3 vij.; Vini Ipecacuanhæ 3 jss.; Extr. Lactucæ 3 jss.; Syrup. Tolutan. 3 ij. M. Fiat Mist. cujus capiat cochleare unum vel duo larga tertiis vel quartis horis.

## Form. 875. MISTURA ZINCI OPIATÆ.

- R. Aq. Rosarum, Aq. Cinnamom., aa 3 iijss.; Zinci Sulphatis gr. vij.; Tinct. Opii M xxxvj.; Tinct. Cinnamom. Co. 3 ij.; Syrup. Aurantii 3 jss. M. Fiat Mist. cujus capiat cochlearia ij. ampla bis diè.

## Form. 876. PILULÆ ALKALINÆ ANODYNÆ.

- R. Sodæ Sub-carbon. excis. 3 j.; Saponis Duri 3 j.; Extracti Hyoscyami 3 ss.; Olei Junip. q. s. M. Fiant Pilulæ xl., quarum capiat binas vel tres omni nocte. (Nephritic and Calculous Affections.)

## Form. 877. PILULÆ ALOES CUM FERRO COMPOSITÆ.

- R. Aloës 3 ij.; Assafoetidæ et Myrrhæ, aa 3 ss.; Ferri Sulphatis 3 j.; Caryophyllorum in pulv. 3 j.; Pulv. Capsici gr. xxvj.; Bals. Canad. q. s. M. Fiant Pilulæ lxxvj., quarum capiat binas vel tres pro dose. (Chlorosis, &c.)

## Form. 878. PILULÆ ANODYNÆ.

- R. Pulv. Jacobi Veri gr. iij.; Extr. Stramonii gr. ss.; Ext. Hyoscyami (vel Conii) gr. iij. Fiant Pilulæ ij. horâ somni sumendæ. (In painful Cutaneous Eruptions.)



## Form. 879. PILULÆ ANODYNO-ALTERATIVÆ.

- R Camphoræ rasæ gr. vj.; Hydrarg. cum Cretâ gr. xij.; Sodæ Sub-carbon. exsic. gr. x.; Pulv. Acaciæ gr. iv.; Extr. Hyoscyami gr. xv.; Syr. Simp. q. s. M. Fiant Pilulæ xij., quarum capiat tres statim, et horâ somni.

## Form. 880. PILULÆ APERIENTES.

- R Pulv. Radicis Rhei 3 ss.; Extracti Aloës Aquosi gr. xvij.; Saponis Medicati 3 ss.; Syrup. Simp. q. s. M. Fiant Pilulæ xx., quarum sumantur binæ vel tres, bis in die.

## Form. 881. PILULÆ APERIENTES CUM HYOSCYAMO.

- R Extract. Gentianæ 3 ss.; Extract. Colocynth. Comp. ʒijss.; Pulv. Ipecacuanhæ gr. viij.; Pilul. Hydrarg. ʒj.; Extr. Hyoscyami ʒij.; Saponis Castil. gr. xij. M. Fiat massa æqualis, et divide in Pilulas xxxvj. quarum capiat binas vel tres horâ somni.

## Form. 882. PILULÆ ASTRINGENTES.

- R Aluminis contriti gr. v.; Myristicæ Nucl. contr. gr. iv.; Extr. Gentianæ q. s.; (vel adde etiam Opii Puri gr. j.) Fiant Pilulæ duæ pro dose.

## Form. 883. PILULÆ BELLADONNÆ EXTRACTI ET CINCHONÆ.

- R Extracti Belladonnæ gr. j. ad ij.; Extracti Cinchonæ Ver. ʒj. M. Fiat Pilulas viij.; capiat ij. 6tis horis.

## Form. 884. PILULÆ CAMBOGIÆ, ALOES, ET AMMONIACI.

- R Cambogiæ, Aloës, et Ammoniaci, in pulvere, partes æquales: solve in Aceto; dein liquorem cola, et consume donec crassitudinem idoneam habeat. Divide in Pilulas gr. iv. Capiat binas ad quatuor pro dose. (Diuretic, Purgative.)

## Form. 885. PILULÆ CAMPHORÆ ET AMMONIACI.

- R Massæ Pilulæ Aloës cum Myrrhâ 3j.; Gummi Ammoniaci ʒj.; Camphoræ gr. x.; Syrup. Simplicis q. s. Misce. Fiant Pilulæ xx.; omni mane capiat tres vel quatuor. (STOLL.)

## Form. 886. PILULÆ CAMPHORÆ ET OPII.

- R Camphoræ, Potassæ Nitratis, ʒā 3ij.; Saponis Hispan. ʒss.; Extr. Opii Aquos. ʒss.; Syrup. Tolutan. q. s. M. Fiant Pilulæ cxx., quarum binas vel tres ter quotidie. (CADET DE GASSICOURT.)

## Form. 887. PILULÆ CAMPHORÆ ET QUININÆ.

- R Camphoræ rasæ ʒj.; Quininæ Sulphatis ʒij.; Massæ Pilul. Aloës cum Myrrhâ ʒiss.; Syrup. Zingiberis q. s. M. Fiat massa æqualis et divide in Pilulas xxxvij., quarum capiat unam bis quotidie.

## Form. 888. PILULÆ CHALYBEATÆ.

- R Sub-carbon. Ferri ʒss.; Pulv. Canellæ Albæ 3ij.; Aloës Socot. ʒjss.; Syrup. Croci q. s. M. Fiat massa æqualis.

## Form. 889. PILULÆ COLOCYNTHIDIS CUM SULPHURE.

- R Extr. Colocynth. Comp. ʒj.; Sulphur. Sublimati ʒj.; Potassæ Sulphatis ʒiv.; Syrup. q. s. Divide in Pilulas l.

## Form. 890. PILULÆ COLOCYNTHIDIS EXTR. ET HYOSCYAMI.

- R. Extract. Colocynth. Compos. ʒij.; Extract. Hyoscyami ʒj. Misce, et divide in Pilulas xij. Sumat unam vel duas pro re natâ.

## Form. 891. PILULÆ DEOBSTRUENTES. (1.)

- R Saponis Venet. ʒj.; Pilul. Hydrarg. gr. viij.—xij.; Gummi Ammon. ʒss.; Massæ Pilul. Aloës cum Myrrhâ ʒj.; Terebinth. q. s. M. Fiant Pilulæ xxx.; capiat tres vel quatuor de die.

## Form. 892. PILULÆ DEOBSTRUENTES. (2.)

- R Pulv. Gummi Guaiaci ʒj.; Pulv. Gummi Ammoniaci ʒj.; Ammoniac Carbonatis gr. xv.; Massæ Pilula. Aloës cum Myrrhâ ʒijss.; Tinct. Aloës Comp. q. s. M. Divide in Pilulas xl.; è quibus sumantur tres ter in die cum vasculo infusi Anthemidis. (Altered from STOLL.)

## Form. 893. PILULÆ DIURETICÆ ET ANTISPASM.

- R Pulv. Fol. Digitalis, Pulv. Rad. Scillæ, ʒā gr. xij.; Extr. Hyoscyami ʒj. Divide in Pilulas xij. Capiat binas tertiis horis. (BRERA.)

## Form. 894. PILULÆ DIURETICÆ CUM HYDRARGYRO.

- R Gummi Ammoniaci, Extracti Taraxaci, Saponis Venet., ʒā ʒj.; Pulveris Scillæ gr. vj.; Pilulæ Hydrargyri gr. xv.; Olei Junip. q. s. M. Fiant Pilulæ xvij.

## Form. 895. PILULÆ EXPECTORANTES.

- R Pulveris Scillæ ʒj.; Ammoniaci Gum. Res. ʒjss.; Extract. Conii ʒij. Contunde simul, et divide massam in Pilulas æquales triginta; quarum sumat duas sextis horis. (In Asthma and Chronic Catarrh.)

## Form. 896. PILULÆ GENTIANÆ ET ALOES.

- R Aloës Ext. Purif., Gentianæ Extr., ʒā 3j.; Saponis Castil. ʒjss. M. Divide in Pilulas xxxvj.; capiat unam ad tres, pro re natâ.

## Form. 897. PILULÆ GUAIACI ET ACONITI.

- R Ext. Aconiti gr. j.; Pulv. Guaiaci gr. viij.; Olei Cajeputi q. s. ut fiant Pil. ij. Capiat unam manè nocteque.

## Form. 898. PILULÆ HUMULI COMP.

- R Ammon. Sub-carb. gr. vj.; Extr. Rhei gr. viij.; Extr. Humuli gr. xij. M. Fiant Pilulæ vj., quarum capiat tres horâ somni.

## Form. 899. PILULÆ HYDRARGYRI COMPOSITÆ.

- R Pilul. Plummeri 3 ss.; Pulv. Jacobi Veri gr. xij.; Extracti Conii gr. xxij.; Saponis Castil. gr. vj. Contunde simul, et divide massam in Pilulas xij. æquales, quarum binæ omni nocte sumantur.

## Form. 900. PILULÆ IPECACUANHÆ COMP.

- R Pulv. Ipecacuanhæ gr. vj.; Pulv. Ipecacuan. Comp., Extr. Papaveris, ʒā ʒj.; Extr. Humuli 3 ss.; Olei Anisi q. s. M. Fiant Pilulæ xxiv.; quarum capiat unam quartis horis, vel binas aut tres horâ somni.

## Form. 901. PILULÆ MORPHINÆ ET FERRI SULPHATIS.

- R Sulphatis Morphinæ gr. ij.; Olei Amygdal. q. s.; ad solut. dein adde Ferri Sulphatis gr. vj.; Pulv. Glycyrr. gr. viij.; Mellis q. s. ut fiant Pilulæ viij. Capiat unam tertiâ quâque horâ.

## Form. 902. PILULÆ MORPHINÆ SULPHATIS.

- R Sulphatis Morphinæ gr. j.; Pulv. Ipecacuanhæ gr. iij. Extr. Aconiti gr. vj.; Olei Amygdal. Dul. ʒvj.; Pulv. Glycyrrh. et Mellis ʒā q. s. ut fiant Pilulæ viij. Capiat unam 3tiis vel 4tis horis.

## Form. 903. PILULÆ MOSCHI COMPOSITÆ.

- R Moschi, Potassæ Nitratis, ʒā gr. vj.; Camphoræ rasæ gr. vj.; Conserv. Ros. q. s. Fiant Pilulæ vj.

## Form. 904. PILULÆ MURIATIS CALCIS ET CONII.

- R Calcis Muriatis gr. ij.; Extr. Conii gr. iij.—v. Fiant Pilulæ duæ, bis in die sumendæ. (Scrofulous Obstructions.)

## Form. 905. PILULÆ NERVINÆ. (1.)

- R Assafoetidæ ʒss.; Castorei gr. vj.; Extract. Hyoscyami gr. x.; Extract. Anthemidis ʒj.; Syrup. Papaveris q. s. M. Fiant Pilulæ xij.; capiat ægra duas manè nocteque.

## Form. 906. PILULÆ NERVINÆ. (2.)

- R Assafoetidæ ʒij.; Camphoræ Subactæ gr. xvj.; Moschi gr. vj.; Mucilag. Acaciæ q. s. M. Fiant Pilulæ xvj., è quibus sumatur una omni bihorio.

## Form. 907. PILULÆ NUCIS VOMICÆ ET ALOES.

- R Pilul. Aloës cum Myrrhâ ʒiv.; Extracti Nucis Vomicæ gr. x. M. Fiant Pilulæ xxxvj.; quarum capiat unam ad duas, manè nocteque.

## Form. 908. PILULÆ SARSÆ COMPOSITÆ.

- R Massæ Pilul. Hydrarg. gr. viij.; Extr. Taraxaci, Extr. Sarsaparillæ, ʒā ʒv. M. Fiant Pilulæ xlviij., quarum capiat tres quater in die.

## Form. 909. PILULÆ SCILLÆ ET GALBANI COMP.

- R Pilul. Galbani Comp. ʒj.; Pilul. Scillæ Comp. ʒij.; Ol. Juniperi ʒv. M. Divide in Pilul. xxiv., quarum sumat binas ter quotidie.

## Form. 910. PILULÆ SODÆ CUM RHEO ET HYOSCYAMO.

- R Sodæ Sub-carbon. exsic. ʒijss.; Pulv. Rhei 3j.; Extr. Hyoscyami ʒij. M. Divide in Pilulas xxxvj., quarum, ter quotidie, binæ sumantur.

## Form. 911. PILULÆ STOMACHICÆ.

- R Pulveris Rhei, Pulveris Zingiberis, ʒā 3 ss.; Extracti Anthemidis ʒj.; Olei Anisi q. s. Fiat massa, in Pilulas æquales triginta dividenda, quarum capiat tres antè prandium quotidie. (In Dyspepsia and Chlorosis, &c.)



## Form. 912. PILULÆ SULPHURETI ANTIMONII.

- R Antimon. Sulphuret. crud., Extract. Dulcamaræ, partes æquales. Sint Pilulæ gr. iij. Capiat iij. vel iv. ter diè.

## Form. 913. PILULÆ THEBAIACÆ COMPOSITÆ.

- R Gummi Ammoniaci 3j.; Camphoræ 3 ss.; Moschi Musc. gr. xx.; Pulv. Opii gr. x.; Bals. Peruviani q. s. M. Fiant Pil. gr. iij. Sumat æger unam horâ undecimâ, iterum vespere horâ quintâ; et cubitum petens sumat tres.

## Form. 914. PILULÆ TONICÆ.

- R Extracti Gentianæ, Pulv. Rhei, aa 3 ss.; Saponis Castil. 3j. M. Fiant Pilulæ xvij., quarum sumantur binæ ter quotidie.

## Form. 915. POTUS APERIENS.

- R Mannæ 3jss.; Potassæ Supert. 3 ss.; Seri Lacti Oij. M. Capiat cyathum pro re natâ.

## Form. 916. POTUS TAMARINDORUM COMP.

- R Potassæ Tartar., Pulp. Tamarind., Gum. Arab., aa 3j. Solve in Aq. Font. Fervid. lbij. et adde Oxymel. Simp. 3ij. M.

## Form. 917. PULVIS AMMONIACO-CAMPHORATUS.

- R Ammon. Sub-carbon. gr. iv.; Camphoræ Pulveriz. gr. ij.; Sacch. Alb. gr. xxiv. M. pro dose; vel fiant Pil. ij. cum Mucilag. Acaciæ, omittend. Saccharo.

## Form. 918. PULVIS ANTICATARRHALIS.

- R Kermes Mineral. gr. iij.; Florum Sulphuris, Pulv. Rad. Glycyrrh., aa gr. xij. Fiat Pulvis, ter die sumendus. (QUARIN and BARTHEZ.)

## Form. 919. PULVIS APERIENS.

- R Magnes. Sub-carbon. 3ij.; Potassæ Supertart. 3j.; Pulv. Rhei, Pulv. Rad. Glycyrrh., aa gr. vj.—xij. Fiat Pulvis omni nocte sumendus in theriacâ comuni.

## Form. 920. PULVIS CALUMBÆ ET FERRI.

- R Ferri Tartarizati gr. x.—xv.; Pulv. Calumbæ gr. xij.—3j. Fiat Pulvis, ter quotidie capiendus.

## Form. 921. PULVIS CAMPHORÆ ET ANTIMONII.

- R Camphoræ rasæ gr. xvj.; Potassæ Tartar. 3j.; Antimon. Tartarizat. gr. j. M. Probe, et in cartulas viij. divide; quarum sumatur una tertiâ quâque horâ.

## Form. 922. PULVIS DIAPHORETICUS.

- R Kermes Mineralis, Camphoræ, aa gr. iij.; Gum. Acaciæ, Sacchar. Albi, aa gr. viij.; Olei Fœniculi ℥j. M.

## Form. 923. PULVIS LIENTERICUS.

- R Hydrarg. cum Cretâ gr. iij.; Pulv. Ipecacuan. Comp. gr. vj.; Pulv. Rhei gr. v.; Pulv. Cinnamom. gr. vj. M. Fiat Pulvis, bis vel ter die sumendus.

## Form. 924. PULVIS MOSCHI COMPOSITUS.

- R Moschi gr. vj.—xij.; Pulv. Rad. Valerian. 3j.; Camphoræ gr. vj. M. Fiat Pulvis.

## Form. 925. PULVIS MYRRHÆ ET IPECACUANHÆ.

- R Pulv. Myrrhæ gr. xvj.; Pulv. Ipecacuan. gr. iv.; Potassæ Nitratis in pulv. 3ij.; Pulv. Opii gr. j. Misce benè, et divide in doses æquales quatuor. Capiat unam quartâ quâque horâ.

## Form. 926. PULVIS PRO TORMINIBUS.

- R Magnes., Sacchari Albi, aa gr. viij.; Pulv. Canellæ Corticis gr. ij. M. Fiant Pulvis.

## Form. 927. PULVIS RESOLVENS. (STAHLII.)

- R Pulv. Antimonialis, Potassæ Nitrat., Ocul. Cancr. Præp., aa 3j.: tere benè simul. Dosis 3j.

## Form. 928. PULVIS SALINUS.

- R Potassæ Chloridis gr. v.—xij.; Sodæ Muriatis gr. viij.—xx.; Sodæ Carbonatis gr. x.—xv.; Olei Pimentæ, vel Cajeputæ, vel Sine, ℥ij.—v. M. Fiat Pulvis pro re natâ sumendus in decocto Hordei vel jusculo Bov.

## Form. 929. PULVIS SODÆ NITRATIS COMPOSITUS.

- R Sodæ Nitratis gr. v.—3j.; Pulv. Cinnam. gr. vj.; Pulv. Ipecacuanhæ gr. ss.—j.; Olei Pimentæ ℥j. M. Fiat Pulvis ter quaterve in die sumendus. (Diarrhœa, Dysentery.)

## Form. 930. PULVIS VALERIANÆ COMPOSITUS.

- R Pulv. Rad. Valerian. 3j.—3ij.; Magnes., Mur. Ammon., aa gr. v.; Olei Cajeputi ℥ij. M.

## Form. 931. SOLUTIO BELLADONNÆ EXTRACTI.

- R Extracti Belladonnæ 3j.; Aquæ Destillatæ 3j. M. Fiat Solutio.

## Form. 932. SOLUTIO CAMBOGIÆ ALKALINÆ.

- R Gum. Res. Cambogiæ 3 ss.: solve in Liquor. Carbon. Potassæ 3 ss. Hujus solutionis capiat ℥xx., quater in die, quovis in vehiculo idoneo. (Both Diuretic and Cathartic. HAMBURGH DISPENSATORY.)

## Form. 933. SOLUTIO HYDRO-SULPHATIS CALCIS.

*A Hydrosulphate of the Protoxide of Calcium.*

- R Sulphur. Pulveriz. lbj.; Calcis Vivi lbij.; Aq. Fontanæ lb xv. Coque per partem horæ quartam, et cola. (PIERQUIN'S Antipsoric Milk. HAHNEMANN and PASSING recommend it as a gargle in salivation; and a dessert or table spoonful of it is to be taken internally in some soup (mutton or veal broth), in cases of poisoning by mercurials.)

## Form. 934. SOLUTIO REFRIGERANS.

- R Nitrat. Potassæ 3 ss.; Muriatis Ammoniacæ 3ij.; Aq. Pur. 3viij. Solve leni cum calore, et adde Camphoræ Pulverizat. 3jss.; Alcoholis q. s. Macera. Capiat 3j.—3ij. in decocti Hordei cyatho.

## Form. 935. SYRUPUS ANTIMONIATUS.

- R Kermes Miner. 3j.; Syrup. Scillæ, Syrup. Althææ, aa 3jss. M. Capiat Coch. j.—ij. minima, ter quaterve in die.

## Form. 936. TINCTURA ASTRINGENS.

- R Catechu, Myrrhæ, aa 3 ss.; Pulv. Cinchonæ 3ij.; Balsami Peruvian. 3jss.; Spirit. Armoraciæ, Spirit. Vini Rectificati, aa 3jss. Misce, et digere. (For Sponginess of the Gums.)

## Form. 937. TROCHISCUS ASTRINGENS.

- R Catechu 3ij.; Moschi 3ij.; Sacchar. Albi 3ijss.; Mucilag. G. Tragacanth. q. s. Misce. Fiant Trochisci parvuli. (For Relaxation of the Uvula, Hoarseness, &c.)

## Form. 938. UNGUENTI CHLORURETI CALCIS.

- R Chlorureti Calcis in pulv. subtil. redac. 3ijss.; Turbith. Mineral. in pulv. 3ij. Misce benè; dein tere cum Axong. 3ijss.; Olei Amygdal. Dulc. 3j. M. Fiat Unguentum.

## Form. 939. VINUM FERRI.

- R Tinctur. Ferri Muriatis f3j.; Vini Albi Hispan. f3xv. M.







## PROSPECTUS.

THIS work contains, in an abstract and condensed, yet comprehensive form, the opinions and practice of the most experienced writers, British and Foreign, so digested and wrought up with the results of the Author's practice, that the Student and Young Practitioner will not be bewildered in the diversity of the opinions and facts adduced for their instruction, but be guided in the difficult path on which they have entered, and enabled, with a due exercise of their powers of observation and discrimination, to arrive at just conclusions and successful practical results. To the experienced Practitioner, also, the work will present a diversified range of opinions, methods of cure, and authorities, which his matured judgment will enable him to apply in an appropriate manner to particular cases. It also comprises the complications and modified states of Disease, which are even more frequently met with in practice, than those specific forms too often described by Nosologists as constant and unvarying types, to which morbid actions, occurring under a great variety of circumstances, can never closely adhere. When discussing the methods of cure, the Author has attended to the various stages, states, and associations of disease, to the regimen of the patient, and to the management of convalescence. He has given prescriptions for the Medicines recommended, in the most efficient states of combination. He has also added, in an Appendix, and arranged in alphabetical order, upwards of a thousand Formulæ, selected from those most approved contained in the Pharmacopœias of various hospitals and foreign countries, and the writings of eminent practical Physicians, and from the notes of his own practice. The work, moreover, contains a full exposition of the general principles of Pathology; a minute description of the numerous organic lesions of the human body; and a detailed account of those states of disorder incidental to the sex, the different periods of life, and to particular climates, with the peculiarities resulting from temperament and habit of body. It is prefaced by a classification of Diseases according to pathological principles, and in natural order, commencing with the simplest and most limited states of functional disorder, advancing through the more extended and complicated diseases to those affecting the whole frame, and concluding with such as consist chiefly of morbid structure — the classification thus being a key to the systematic study of practical medicine, as well as an arranged contents of the work. In order to facilitate reference, as well as to avoid repetition, each article is methodically divided and headed, and the paragraphs numbered; and to each a copious Bibliography, with References, is added.

The Author having, since 1814, been in the habit of recording references to such medical works, memoirs, and subjects as he has found upon perusal deserving of notice, presents the accumulated results to the reader. He has excluded from his Bibliography all inferior productions, and nearly all inaugural dissertations; he has selected those works with whose character he is acquainted, and whose authors are distinguished; and he has brought down his record to the present day. He has likewise given copious references to such original papers and memoirs in the Transactions of societies, and in medical journals, as merit notice, believing them to constitute a most valuable part of medical literature and science.

In conclusion, the work contains the results of many years of laborious study and research, and upwards of twenty-five years' extensive and diversified experience, forming of itself a Library of Practical Medicine, and copious Digest of Medical Literature. It is printed in a small but clear type cast for the purpose, in the common 8vo size, and will be published in Six Parts, the whole being confined within the compass of two large Volumes. It will be completed in the course of a few months.

*Bulstrode Street, Cavendish Square,  
April, 1835.*

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## NOTICE.

- I. The PREFACE, with a *Pathological Classification of Diseases, &c.*, forming a Key to the Systematic Study of Practical Medicine, as well as an arranged Table of Contents of the Work, will accompany the last Part.
- II. An INDEX of the individual topics comprised under the various Chapters and Sections of each Article will also be given in the last Part.
- III. Although several Subjects usually treated of by names which come under the latter part of the Alphabet have been already considered, yet the Author cannot do justice to his task in less than Six Parts.